PB-216 134

DISTRICT OF COLUMBIA SOLID WASTE MANAGEMENT PLAN

District of Columbia Department of Sanitary Engineering
Washington, D. C.

1971

DISTRIBUTED BY:

NTIS

National Technical Information Service
U. S. DEPARTMENT OF COMMERCE
5285 Port Royal Road, Springfield Va. 22151

SOLID WASTE MANAGEMENT PLAN

DISTRICT OF COLUMBIA

status report 1970

PB 216 134

DISTRICT OF COLUMBIA

SOLID WASTE MANAGEMENT PLAN

Status Report 1970

This report (SW-4tsg) was prepared by the District of Columbia for the Federal solid waste management program under State planning grant (UI-00030)

Reproduced by
NATIONAL TECHNICAL
INFORMATION SERVICE
U S Department of Commerce
Springfield VA 22151

U.S. ENVIRONMENTAL PROTECTION AGENCY
1971

An environmental protection publication in the solid waste management series (SW-4tsg).

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 - Price $1.25
Stock Number 5502-0029

FOREWORD

TO ENCOURAGE SYSTEMATIC PLANNING for better management of the Nation's solid wastes, Congress in the 1965 Solid Waste Disposal Act provided grant monies for the States for solid waste planning.[1] By June 1966, fourteen States had met the stipulations of the Act and had embarked upon the planning process with the help of the Federal funds. Today, several interstate agencies, the District of Columbia, and almost every State have applied for and received a solid waste planning grant.[2] From each of the grants the Federal government expects two practical results: first, a plan (and report) for the State's management of its solid wastes; second, development of an agency for the managing function.[3]

The present document describes the District of Columbia's solid waste storage, collection, and disposal practices existing at the time of the study. The two-year study was made by the District under a Federal solid waste management planning grant that went into effect February 1, 1968. The findings provide the base for the plan recommended herein. But, the planning process is dynamic; future revision will be an

---

[1]The Solid Waste Disposal Act; Title II of Public Law 89-272, 89th Congress, S.306, October 20, 1965. Washington, U.S. Government Printing Office, 1965. 5 p.

[2]Toftner, R. O., D. D. Swavely, W. T. Dehn, and B. L. Sweeney, comps. State solid waste planning grants, agencies, and progress--1970; report of activities through June 30, 1970. Public Health Service Publication No. 2109. Washington, U.S. Government Printing Office, 1971. 26 p.

[3]Toftner, R. O. Developing a state solid waste management plan. Public Health Service Publication No. 2031. Washington, U.S. Government Printing Office, 1970. 50 p.

important part of the process to take account of changing conditions and better data. Moreover, a plan is not an end in itself. Its formulation is the key to action: to legislation, standards, technical assistance, public relations, and enforcement.

Besides providing the District of Columbia solid waste management agency with a guide for action, the District's plan will help to guide local regional solid waste planning and subsequent implementation. The plan can also provide support for improved legislation related to solid waste management.

The District of Columbia's plan is designed, therefore, to: (1) establish the continuing process of planning; (2) establish policies and procedures to guide the District solid waste agency, the Department of Sanitary Engineering; (3) interface with regional planning; (4) provide a documented base for improved solid waste legislation and operating regulations. With these objectives in mind, this plan report presents and analyzes pertinent solid waste data, identifies problems indicated by the data, sets objectives that if achieved would solve identified problems, and finally, proposes immediate, intermediate, and long-range measures for achieving objectives. This plan should thus provide the District's solid waste agency with an invaluable management tool with which to begin solving its solid waste management problems.

--RICHARD D. VAUGHAN
Assistant Surgeon General
Acting Commissioner
Solid Waste Management Office

TABLE OF CONTENTS

	PAGE
Summary and Recommended Plan	1
Chapter One: Laws and Regulations	7
Chapter Two: Hospital Solid Waste Management	11
Chapter Three: On-Site Solid Waste Handling	17
Chapter Four: Collection	31
Chapter Five: Disposal	59

APPENDICES

A. Proposed Health Regulations Title 8, Chapter 3, Part 6 Solid Waste Regulations	83
B. Service Charges for Collection and Disposal of Solid Waste	95
C. Demolition and Excavation	103
D. Commercial Haulers and U.S. Government Haulers	107
E. Abandoned Automobiles	111
F. Other District of Columbia Collections	113
G. Boundary Maps of Existing Collection Branches and of Proposed Collection Districts	117
H. Proposed Operation of An Area-Based Collection Organization	123
I. Method for Determining Staffing Requirements for the Area-Based System of Solid Waste Collection	129

INTRODUCTION

This document reports upon the findings of a two-year study of solid waste storage, collection and disposal practices in the District of Columbia. This was a joint study by the D C. Health Services Administration (formerly the Department of Public Health) which accepted responsibility for studies relating to laws and regulations, storage and disposal of hospital wastes, and storage and disposal of waste at households and commercial establishments, and the D. C. Department of Sanitary Engineering which devoted itself to a study of the collection and disposal of solid wastes.

Throughout the study there was close coordination between the two departments and with other departments when the studies being performed related to their responsibilities.

The preparation of this study and report was financially aided in part by a grant from the U. S. Public Health Service, Department of Health, Education, and Welfare. *

No study of the scope of the present study can be successfully concluded without the cooperation and assistance of many people. It would be impossible to list all of those who made a contribution to this report and a listing of some without proper acknowledgement of others would be basically unfair. It has been decided, therefore, not to list any individuals but to express gratitude to all who helped.

---

*The Bureau of Solid Waste Management of the U.S. Public Health Service which aided in funding this grant is now the Solid Waste Management Office of the U.S. Environmental Protection Agency.

SUMMARY AND RECOMMENDED PLAN

This report describes the District of Columbia's solid waste collection and disposal situation as it existed at the time of the study. The various problems are analyzed and improvements are recommended. The aggregate of these improvements constitutes the plan which is recommended herein. This section of the report will consider the major elements of the plan. However, it must be recognized that there are many supporting details which must be accomplished if these major elements of the plan are to be implemented. Those responsible for implementing the plan should consider these details as well as the major items carefully.

Special attention must be drawn here to the proposed D. C. solid waste regulations which are included in this report as Appendix A. Adoption of these regulations is recommended and reference should be made to them as a supplement to the information and plan provided by this report.

A summary of the conclusions and major elements of the recommended plan are as follows:

1. Official responsibility for the development of a satisfactory waste collection and disposal system in the District of Columbia is scattered among many agencies. In order to improve the management of on-site storage of solid wastes, the responsibility for regulation should be assigned to a single agency. This report recommends that the District of Columbia Government assign this responsibility to the District of Columbia Health Services Administration since this agency's broad interest in the health of the people more aptly fits the responsibilities envisioned than the assigned responsibilities of any other department of the District Government.

2. The large number of unregulated private and commercial refuse collectors and haulers employing a variety of equipment and practices requires that regulations be enacted to govern their actions. The responsibility for enforcing such regulations should also be delegated to the Health Services Administration.

3. The District of Columbia Health Services Administration is not adequately staffed to carry out the plan elements 1 and 2 above.

It is necessary, therefore, that implementation of the recommended action by the District of Columbia Government on Items 1 and 2 also provide for adequate staff to discharge the assigned responsibilities. Provision of such staff would allow the D. C. Health Services Administration to begin to develop the necessary regulations in cooperation with other interested departments and agencies and to provide the necessary inspection and enforcement of the regulations.

4. The collection and disposal of solid waste should be viewed as a utility function and made self supporting. This element of the plan is discussed in Appendix B. The service charges should vary with the services provided. Household units having collection service by the District would pay for both collection and disposal. The billing for the service could be added to the water and sewer service charge bill. Commercial collectors, federal installations and others who deliver directly to the disposal facility would pay only for disposal on a tonnage basis. The cleaning of public space (streets, alleys) would continue to be supported by appropriated general funds.

5. The Department of Sanitary Engineering has a planned program for the conversion to an area-based system of administration of sanitary services. This system will provide for closer supervision, establishment of responsibility, and pride of accomplishment. This proposal is completely endorsed as part of the solid waste plan with the recommendation that it be implemented as soon as possible.

6. During the course of the study, the Department of Sanitary Engineering began the implementation of the previously planned program to convert its collection vehicle fleet to packer type equipment and to begin the collection of combined garbage and refuse on a twice per week basis. This improvement is completely endorsed as an essential element of the plan with the suggestion that the improved service be evaluated for effectiveness after implementation. Should the evaluation indicate the necessity for more frequent collection in some parts of the city, provision should be made to provide this needed service.

7. Trash cans are being issued free or sold at cost to needy families (depending upon their financial circumstances), under the "War on Rats" program — to the extent that funds are available for this purpose. The effectiveness of this program should be determined in order to evaluate the feasibility of the establishment of this procedure as a city-wide service.

8. As the District of Columbia converts to combined collection of garbage and refuse, the present separate collection of garbage will be discontinued. Regulations should be revised to include among other things that all new food establishments and residential buildings provide garbage grinding units at the time of construction, and that all existing commercial food establishments install garbage grinders by July 1, 1971. At other locations where trash collection service is not provided by the

District, arrangements should be made with the commercial collector to collect garbage as well as trash.

9. The Department of Sanitary Engineering should continue its efforts to obtain adequate disposal capacity. Insofar as possible, this disposal capacity should be incorporated in several facilities in order to provide flexibility in the event of emergencies caused by breakdown. At the time this report was written the Department of Sanitary Engineering was attempting to implement a disposal plan which incorporated:

a. The construction of Incinerator No. 5 with a capacity of 1500 tons per day having sophisticated air pollution control equipment designed to meet air quality criteria. This incinerator will be located off Benning Road adjacent to the Potomac Electric Power Company generating plant.

b. A transfer and baling station which is being designed to handle 1000 tons per day; this capacity can be expanded by operating the station an extra shift. Transportation from the station to sanitary landfills would be by barge.

c. A railhaul system from the District of Columbia to a distant sanitary landfill. A tentative commitment had been made to the Washington Metropolitan Council of Governments to participate in a regional disposal program to the extent of 1000 tons per day, provided the metropolitan system operation could be assured soon enough. In the event that the Council of Governments' system cannot be assured in time to meet the District of Columbia's very tight deadlines for disposal alternatives, an effort will be made to obtain bids from railroads to operate a complete system including the transfer station and sanitary landfill.

d. The operation of the Oxon Cove Sanitary Landfill in a manner which would permit the eventual development of a golf course on the site. This is estimated to require two years which would allow time for the completion of construction of Incinerator No. 5.

10. Upon the implementation of the disposal plan mentioned in paragraph 9, adequate capacity will be available and can be expanded as needed. At that time the incinerators now in operation should be removed from service.

11. Consideration should be given to the utilization of intermediate transfer facilities to provide more effective use of collection vehicles and personnel and to minimize the concentration of collection vehicles at the disposal point.

12. The enforcement of the air quality control regulations which require the present flue-fed single chamber private incinerator to be

replaced with more effective units or abandoned altogether will probably result in a significant increase in the amount of solid wastes for which the District must provide disposal facilities. This factor must be recognized in the long range planning for adequate capacity of facilities.

13. The special services provided for the incineration of confidential material seriously interfere with the normal operation of D. C. incinerators, thus reducing their effective capacity. The practice of providing this special service should be discontinued. Confidential materials should receive preliminary processing such as shredding so that they may be delivered to, and handled by, the incinerators in the same fashion as other trash.

14. The Department of Sanitary Engineering's plan to incinerate sewage sludge at the waste treatment plant in a facility equipped with modern air pollution control devices appears to be the best solution to the problem and is endorsed. The ash resulting from that incineration may be then transported to a sanitary landfill together with the incinerator residue from trash incinerators.

15. At the present time the District of Columbia transfer station located at New Jersey Avenue and 'K' Streets S.E. is used for garbage grinding with discharge to the sewer, for the transfer of materials to Cherry Hill, and for transfer of incinerator residue. Upon the implementation of the disposal plan mentioned in Paragraph 9 and the conversion of the entire city to combined garbage and refuse collection, this facility will no longer be needed for its present function.

16. The leaf disposal program provides for a maximum utilization of this compost material as a soil conditioner and should be continued in cooperation with the National Park Service. Since the number of available sites for composting is limited, provision should be made for the incineration or landfilling of the remainder.

17. The collection and disposal of abandoned automobiles has been a most difficult problem. Abandoned autos not only are a source of litter in themselves, but also appear to encourage the accumulation of litter. Abandoned vehicles whether on private or public property should be rapidly identified and removed for disposal.

18. The Health Services Administration should require all hospitals and other related medical facilities to publish and implement effective regulations for the proper handling and disposal of hazardous wastes and to train all professional and sub-professional personnel adequately in the proper techniques and procedures for handling such wastes.

19. The Health Services Administration should encourage hospital and related medical facilities to use heavy duty plastic bags with metallic strip tie or a liner of similar material for the storage of solid wastes.

20. All hospitals and other medical facilities should consider the use of heavy duty compactors and modern on-site storage and disposal systems in the solution of their solid waste disposal problems.

CHAPTER ONE. LAWS AND REGULATIONS

I. EXISTING PROVISIONS

The District Government has the responsibility for the regulation of all facets of solid waste handling including on-site storage, reduction and disposal, collection, transportation and central disposal. It also has the responsibility of providing for the collection and disposal of solid waste from residences of not more than three units and for the disposal of all refuse generated within the District. Several departments within the District Government are responsible for various aspects of solid waste management, resulting in fragmentation of solid waste control and enforcement authority. The four departments directly involved in the management of solid waste are the Departments of Sanitary Engineering and Economic Development, the Health Services Administration and the Metropolitan Police.

The Health Services Administration's solid waste functions under the general supervision of the Associate Director for Environmental Health are as follows:

1. The Bureau of Public Health Engineering is responsible for certain public health aspects of solid waste disposal and other environmental engineering activities, e.g., research, planning, development of laws and regulations, consultations.

2. The Bureau of Food and Drugs is responsible for the enforcement of the provisions of pertinent regulations for the on-site storage of solid waste at food and drug establishments.

3. The Bureau of Community Hygiene is responsible for surveillance over the on-site storage of solid waste at industrial, institutional, and commercial (except hotels and motels) establishments and vacant lots.

4. The Bureau of Milk Control has jurisdiction over milk and ice cream plants.

The Department of Economic Development's solid waste functions under the general supervision of the Chief, Bureau of Licenses and Inspection, are as follows:

Preceding page blank

1. The Housing Division is responsible for the enforcement of those provisions of the Housing Regulations pertaining to the on-site storage of solid waste and the cleanliness of premises at all residential dwellings, hotels and motels.

2. The Board for the Condemnation of Insanitary Buildings is responsible for insuring the removal of solid waste from condemned buildings and the premises thereof.

3. The License and Permit Division is responsible for licensing garbage collection vehicles upon the recommendation of the Bureau of Sanitation Services, Department of Sanitary Engineering.

The Metropolitan Police Department's solid waste functions are as follows:

1. Their field operations are responsible for the investigation and declaration of abandoned vehicles, the collection of such vehicles from private property and public spaces, and their subsequent disposition.

2. The Property Division is responsible for the impounding of abandoned vehicles and their ultimate disposal.

The Department of Sanitary Engineering is responsible for carrying out the following solid waste functions under the Bureau of Sanitation Services:

1. Collection and transportation of all solid waste from one, two and three family dwellings, and public spaces and parks not under the jurisdiction of the Federal Government.

2. Operation of the District's disposal facilities — incinerators, sanitary landfills and transfer station.

3. Cleaning the streets, alleys and other public spaces not under the jurisdiction of the Federal Government.

4. Inspection of private garbage collection vehicles and recommendations for approval of the licensing of such vehicles by the Licensing and Permit Division, Department of Economic Development.

5. Collection, transportation and disposal of solid waste from certain District-owned facilities.

The current solid waste laws and regulations are prescribed under various titles and authorities. Public Law 86-104 limits the Government of the District of Columbia's trash collection service to dwellings in which fewer than four units share a central heating system. The law also authorized that funds be expended for the separate collection of garbage

and for the disposal of all solid waste. Title 6 of the District of Columbia code authorizes the Commissioner to provide solid waste collection and disposal service; however, the conditions under which this service is to be accomplished are not clearly defined.

Primary solid waste control and enforcement authority is prescribed in Articles 3 and 21, Police Regulations, and Article 260, Housing Regulations. Article 21, Police Regulations, prescribes the key provisions for the implementation of overall solid waste management within the District. However, most of the pertinent provisions of the article are obsolete and not readily enforceable.

The Congress enacted Public Law 90-440, entitled "District of Columbia Air Pollution Control Act," for incorporation in the District of Columbia Code. In order to implement this act, the Air Quality Control Regulations were promulgated as District of Columbia Health Regulations on February 7, 1969. These regulations will effectively curtail the operation of most of the present single chamber and flue-fed incinerators. All newly constructed private incinerators must be in compliance with the regulations; existing units have up to three years from the date of promulgation of these regulations to meet the new criteria.

In view of the variety and complexity of solid waste laws and regulations, a compilation[1] of these regulations along with recommendations for their improvement was included as one of the major elements of this study. The necessary research and study to formulate the compilation and recommendation of the existing laws and regulations was accomplished under contract with the Health Services Administration by a member of the District of Columbia Bar and former Assistant Corporation Counsel, District of Columbia.

The consultant strongly emphasized that Article 21, Police Regulations, was obsolete and difficult to enforce. In essence, the consultant's conclusions were to the effect that the District of Columbia could achieve improved solid waste management by taking the following actions:

1. Replace Article 21, Police Regulations, "Garbage, Ashes, and Other Refuse," with modern and readily enforceable solid waste regulations.

2. Centralize solid waste control and enforcement authority in one department.

3. Place all private solid waste collection service under District control through a collection vehicle licensing and inspection system.

---

[1] Faircloth, Olive G. Laws and Regulations Relating to Solid Waste Management Affecting the District of Columbia. Washington, D.C. Health Services Administration. 1969. 310 pp.

II. CONCLUSIONS AND RECOMMENDATIONS

This report supports the consultant's conclusions and recommends the following actions:

1. Revision of Article 21, Police Regulations, to include improved solid waste regulations.

2. Organization of a centralized enforcement agency in the Health Services Administration. In addition to the regulation of the environmental health aspects of the storage, collection, transportation and disposal of solid waste and routine surveillance over all vacant lots and public spaces, its functions should include review and development of related legislation, field study and consultations. The agency should be adequately staffed with engineers, sanitarians, technicians, and administrative and clerical personnel.

3. Establishment of District control over private solid waste collection service by a collection vehicle licensing and inspection system, to be conducted by the Health Services Administration. There are approximately 1700 vehicles engaged in private collection service and the license fees collected therefrom would help defray some of the cost for personal services to be provided by the proposed enforcement agency.

CHAPTER TWO. HOSPITAL SOLID WASTE MANAGEMENT

I. INTRODUCTION

Hospital solid waste management was analyzed separately for this report in an effort to improve specifically the management of the handling of hospital wastes which present unique hazards to those who handle them and to the environment. Studies were made to observe and evaluate the present practices at hospitals for the handling of hazardous wastes, such as infectious wastes, laboratory animals, unused pharmaceuticals and their containers, and single-service hypodermic needles.

In order to obtain reliable information on the handling of hazardous wastes, it was necessary to study the total amount of solid waste that was generated at each hospital. Solid waste problems were observed at twelve of the seventeen hospitals which are located in the District of Columbia. Standards for evaluation of hazardous waste collection, storage and disposal practices were in line with those recommended by recognized authorities and interdepartmental experts.

II. FINDINGS

Solid waste is generated in D. C. hospitals at an average rate in excess of 11 pounds per patient per day or nine pounds per bed per day. This figure does not include an estimate of the amount of garbage which is ground and discharged to the sewer system, or of specially handled wastes such as pathological or infectious materials which are incinerated.

Data on methods for handling solid wastes are given in Table 1 for the twelve hospitals surveyed. The first three columns describe the hospital and are indicators of the hospital size. Column 1 is a code representing the twelve hospitals studied: column 2, the number of beds in the hospital; column 3, the average patient load. The next three columns, 4, 5 and 6, describe the methods of solid waste handling used in disposing of the refuse. The disposal of hazardous wastes, column 4, is for the most part accomplished by on-site incineration. The remainder is placed in large metal containers or on-site compactors for transfer to compactor trucks for transport to the disposal sites. Garbage, column 5, is disposed of by grinding to sewers. Column 6 describes the disposal of general refuse, either by incineration or by removal to compactor trucks.

TABLE 1

DATA ON THE GENERATION, STORAGE, AND ON-SITE DISPOSAL OF HOSPITAL WASTE

Hosp.	No. of beds	Average patient load	Disposal of H.W *	Disposal of garbage	Disposal of gen. refuse	Freq. of coll. (gen. refuse/wk)	Incin. residue (lbs/day)	Gen. refuse lbs/day	Total s/w lbs/day/ bed	Total s/w lbs/day/ patient
A	152	117	Incin.**	Ground to sewer	Portable containers	12		1,980	13.02	16.9
B	250	250	Incin.**	Ground to sewer	Portable containers	6		2,060	8.25	8.25
C	406	330	Incin.	Ground to sewer	Port. cont. & incin.	6	413	1,880	7.17	8.82
D	367	312	Incin.	Ground to sewer	Port.cont. & incin.	6	224	555	3.95	4.65
E	236	156	Incin.	Fed to hogs	Incin. & port.cont.	6	228	912	3.87	5.85
F	85	69	Incin.	Ground to sewer	Port.cont. & incin.	4	300	56	10.23	12.6
G	1100	1045	Incin.** & port.cont.	Ground to sewer	Port.cont. & compactor	6		12,390	11.25	11.85
H	523	450	Incin.	Ground to sewer	Incin. port.cont.	2	680	960	8.81	10.42
I	335	300	Incin.	Ground to sewer	Incin. port.cont.	6	320	840	6.44	7.20
J	447	375	Compac.	Ground to sewer	Port.cont.	2		4,077	9.12	10.87
K	80	50	Compac.	Ground to sewer	Port.cont.	3		1,370	15.62	25.00
L	396	322	Incin. port.cont.	Ground to sewer	Incin. port.cont.	6	285	2,591	10.13	12.47

NOTE: Pathological waste and garbage are not included in the total refuse (pounds per patient per day) due to their insignificant effect on overall generation of solid waste.

* Hazardous waste

** Pathological waste only

Most of the solid waste generated at the twelve hospitals is incinerated on-site (see Table 2 for hospital incinerator data) or collected by private collectors for disposal at D. C. facilities. It is common practice for these private collectors to provide large containers which can be emptied mechanically, thus minimizing the possibility of health and safety hazards. These containers may be used in conjunction with stationary compaction units.

Compactors were in use at three of the twelve hospitals and a fourth plans to convert from incineration to compaction in the near future. A heavy duty compactor was installed at one of the main buildings of a local 1100-bed hospital on a trial basis. The operation of this compactor has been highly satisfactory.

Most of the hospitals had garbage grinders. Although most had incinerators they were generally used as auxiliary systems for wastes which would present hazards to collectors in the normal methods of collection.

The use of disposables has increased considerably in the past several years. Random sampling of the use of disposables at five hospitals indicated an increase of 15 to 30 percent. The sampling also related that the average patient generated about 1 to 1.5 pounds of disposables daily.

Disposable refuse containers are now in general use. In most of the hospitals surveyed, these have been plastic bags, of 20 to 40 gallon capacity and one to five mill thickness, which are used as liners and containers. They are easily torn, however, and seldom fastened with the proper metallic strip ties prior to transportation for ultimate disposal.

Hospital professional and subprofessional personnel showed insufficient knowledge of the safe handling and disposal of hazardous waste. In many instances, unused pharmaceuticals and infectious waste were stored and disposed of along with other solid waste. The majority of the hospitals surveyed had not published and/or implemented effective in-house regulations on the safe handling and disposal of hazardous waste.

III. CONCLUSIONS AND RECOMMENDATIONS

The majority of the institutions surveyed were equipped with undesirable, hazardous or uneconomical solid waste on-site storage or disposal systems. The report recommends the following specific actions to hospitals and other medical facilities (e.g., private clinics, health centers, nursing homes, laboratories):

TABLE 2

HOSPITAL INCINERATOR DATA

Hosp.	Type	Chambers	Auxiliary fuel burners	Capacity (lbs/hr)	Combustion (temp. °F)	Stack height (feet)	Hours of operation (weekly)	Air pollution controls
A	Pathological	2	2	150	2500	90		After burner & fly ash screen
B	Pathological	2	2	50	2000	45	28	None
C	General refuse	2	2	400	1100	90	48	None
C	Pathological	2	2	75	2500	60	as needed	After burner & fly ash screen
D	General refuse	1	2	450	2200	80	150	None
E	General refuse	2	2	450	1400	80	48	None
F	General refuse	2	1	350	2300	60	168	Fly ash screen
G	Pathological	2	2	250	2000	75	56	After burner & fly ash screen
H	Pathological	3	1	200	2000	100	36	Washwater scrubber
H	General refuse	2	1	700	2000	50	49	Washwater scrubber
I	General refuse	2	1	350	500	100	48	None
J	Pathological	2	1	150	1500	80	45	Fly ash screen
K	None	-	-	-	-	-	-	----
L	General refuse	2	2	500	unknown	150	96	After burner & fly ash screen
L	Pathological	2	1	75	unknown	50	46	After burner & fly ash screen

NOTE: Residue from incinerators are hauled to landfills.
All incinerators are gas fired.

1. Publication and implementation of effective regulations for the proper handling and disposal of hazardous waste.

2. Training in techniques and procedures for the proper handling and disposal of hazardous waste.

3. Consideration and study of the feasibility of greater use of compactors and of other improved on-site storage and disposal systems, e.g., balers, vacuum and pulping systems, and high efficiency destructor incinerators.

4. Use of heavy duty plastic bags with metallic strip to the fullest extent as liners or containers for the on-site storage of solid waste.

5. Utilization of food waste grinders for garbage disposal.

6. Replacement or modification of existing incinerators, as necessary, to meet the requirements of the new Air Quality Control Regulations.

CHAPTER THREE. ON-SITE SOLID WASTE HANDLING

I. INTRODUCTION

On-site storage, reduction and disposal of solid waste prior to its collection and subsequent disposal is that part of a solid waste management program which will have the most direct effect on public health. Major disruption in the collection service or inadequacy of central disposal facilities are generally resolved before becoming a critical threat to the health of the public. Improper on-site handling, however, presents more immediate problems.

Storage containers discussed in this report include metal boxes — larger than one cubic yard in capacity (and designed to be machine-emptied), standard sized domestic containers — usually 20 to 40 gallon capacity, and disposable containers. Reduction methods include stationary compactors which compact the refuse for on-site storage, and garbage grinders which macerate refuse for discharge to sanitary sewers. Hammermills, shredders, or other methods of general refuse pulverization are not in common usage within the District of Columbia and so were not considered in this report. Discussion of disposal is limited to incineration for this same reason.

The statistical information for on-site solid waste storage, reduction and disposal methods was obtained through on-site surveys of a 10 percent random sample of each significant land use code from the D. C. Real Property Data Bank. The random samples were selected by an Automatic Data Processing System from the Data Bank.

II. FINDINGS

A. ON-SITE STORAGE

On-site storage problems are most prominent in areas of high population density and low income such as the Model Cities areas of Shaw, Northwest No. 1., Stanton Park, Trinidad and Lower Cardoza. However, scattered pockets with similar on-site storage problems were found throughout the city. The extent of these problems may be seen in Table 3 for the Shaw Area.

Preceding page blank

Table 4 shows by percentages the locations of domestic solid waste storage areas, types of storages areas, and the incidence of littered storage areas for each of the 17 statistical areas in the city. The map at the end of this chapter shows the boundaries of these areas. Table 5 shows the relationship of the number and condition of trash cans and the number of garbage disposal units to population density as express by the number of occupants per unit and rooms per occupant within each statistical area. Table 6 shows the percentage occurrences of odor and pests associated with solid waste storage within each of the statistical areas.

The following are factors contributing to solid waste storage problems:

1. Inadequate storage capacity and substandard containers.

2. Insufficient collection frequencies by the Bureau of Sanitation Services and by the private solid waste collectors.

3. Separation of garbage and trash.

4. Lack of an effective environmental health education program for the general public.

5. Lack of enforcement of existing regulations.

6. Inadquacy of regulations concerning both on-site storage and handling practices and commercial collection practices.

The following are some of the specific problems observed during the survey:

1. At some apartment buildings open containers such as laundry hampers were used for internal collection and storage.

2. Many householders did not provide a sufficient number of approved containers to accommodate a seven day generation of trash; the overflow of trash was placed in assorted containers such as cardboard boxes, baskets and paper sacks.

3. The storage of garbage was especially unsatisfactory in apartment buildings with four to 12 units. Subsurface garbage can storage was occasionally noted, with its associated problems of stagnant water, fly breeding and obnoxious odors.

4. In areas of high population density a significant number of cans were damaged through rough handling by collectors. A sizeable portion of the container damage, however, was attributed to flimsy construction material.

TABLE 3

SANITARY CONDITIONS OF SOLID WASTE STORAGE AT OWNER-OCCUPIED AND RENTED BUILDINGS IN THE SHAW AREA

Land use	Number surveyed	Renting (%)	No vector control (%)	Average no. S/W containers / activity	Container/ no tight fitting lids (%)	Damaged S/W containers (%)	Littered S/W storage area(%)	Rodents (%)	Flies (%)	Odors (%)
Institutional	3	50	0	3	33	0	0	33	33	0
Offices	20	64	33	3	41	12	12	25	0	12
Stores	99	79	26	3	47	14	20	30	16	7
Shops	57	90	33	3	28	15	13	30	34	6
Gas Stations	11	100	44	5	54	50	10	36	30	10
Apartment Buildings	197	100	25	4	39	34	26	59	53	12
Homes (owner occupied)	250	0	11	3	12	20	10	25	27	5
Homes (rented)	338	100	25	3	24	45	23	54	64	13
Rooming houses	163	94	27	4	36	38	31	56	65	23

NOTE: Shaw Area is one of the five Model Cities Areas.
Approximately twenty-five percent of all structures were surveyed.

5. In the Model Cities areas, as well as in some fringe areas, practically none of the trash containers were properly covered, although in the more affluent areas most containers had lids which were tight fitting.

6. In many of the low and moderate income areas, back and front yards were heavily littered with all types of refuse. This refuse overflowed onto the sidewalks, in street gutters, alleys, and vacant lots. There was evidence of heavy rodent infestations and fly breeding.

7. On some occasions, the District did not collect trash on the scheduled day or collected only a portion of the trash. This situation was particularly evident in the Model Cities areas. Often bulky items were not collected on the date promised by the Bureau of Sanitation Services and would remain on-site, presenting additional health and safety hazards and nuisances.

8. Many commercialand institutional establishments utilized 55 gallon drums for on-site storage. These are too large to be easily handled by collectors. Many had no lids. Some establishments used other unapproved containers. A considerable number of establishments had no containers and placed refuse on the ground or concrete. Many small establishments had no collection service of their own and parasited on other establishments which had contracted for such service.

9. Commercial and institutional establishments often left the lid open on detachable containers allowing refuse to be scattered by wind.

10. Many occupants or owners of premises practice some form of pest control, but the presence or evidence of insects and rodents was noted at numerous buildings and premises. (In the Model Cities areas, a "War on Rats" program was launched under a grant from the Department of Health, Education, and Welfare. However, insect control in the Model Cities and some fringe areas appeared to be carried out only on a limited basis.)

11. The managers of apartment buildings and commercial and institutional establishments reported a considerable number of cases of unsatisfactory service provided by some private collectors. Since these collectors are not under the District's control, there was no agency to receive the complaints and to ascertain that the complainant received proper redress.

12. The District did not provide a sufficient number of field supervisors to maintain close surveillance over its collection crews. There was practically no way to verify whether the collection crews had fulfilled their daily assignments unless complaints were received from the occupant or owner concerned.

TABLE 4 - PERCENTAGE OF LOCATION, TYPES AND CONDITIONS OF ON-SITE DOMESTIC SOLID WASTE STORAGE AREAS

Statistical area	Dwellings surveyed	Location			Type			Condition
		Front yard storage (%)	Back yard storage(%)	Basement or garage storage(%)	Concrete storage area (%)	Ground storage area(%)	Wooden storage area (%)	Littered storage area (%)
I	56	12.5	73.2	14.3	75.0	23.2	1.8	0.0
II	206	2.1	91.2	6.7	35.9	63.5	0.5	2.4
III	476	0.0	95.7	4.2	50.2	46.0	3.8	1.3
IV	295	0.3	97.2	2.4	51.8	45.7	2.4	0.3
V	47	0.0	87.2	12.8	59.5	34.0	6.4	6.4
VI	137	2.9	96.3	0.7	10.9	51.8	0.7	7.2
VII	65	1.5	92.3	6.2	64.6	20.0	15.3	3.1
VIII	70	4.2	95.7	0.0	34.2	57.1	8.6	7.1
IX	52	1.9	88.4	9.6	26.9	69.2	3.8	1.9
X	370	0.0	96.2	3.7	37.8	60.5	1.6	2.4
XI	32	3.1	93.7	3.1	0.0	100.0	0.0	0.0
XII	91	0.0	96.7	3.3	42.8	48.3	8.7	0.0
XIII	173	0.0	100.0	0.0	5.2	94.2	0.6	0.6
XIV	71	0.0	95.7	7.1	45.0	26.7	28.1	2.8
XV	363	0.3	97.7	1.9	66.9	23.1	9.9	7.2
XVI	99	0.0	93.9	6.1	70.7	24.2	5.1	2.0
XVII	224	0.0	99.5	0.4	71.8	19.6	8.5	8.0

TABLE 5

AVERAGE NUMBER OF SOLID WASTE CONTAINERS AND PERCENTAGE OF GARBAGE DISPOSAL UNITS AS RELATED TO THE DENSITY OF POPULATION

Statistical area	Units surveyed	Average number - occupants per unit	Average number - rooms per occupant	Average number-trash cans per unit	Average number trash cans per occupant	Trash cans/ tight fitting lids (%)	Damaged trash cans (%)	Garbage disposal units (%)
I	56	2.66	2.7	3.35	1.26	10.7	7.1	41.0
II	206	3.40	2.13	3.86	1.13	3.9	6.9	19.4
III	476	3.70	1.85	3.89	1.05	8.1	10.3	11.1
IV	295	4.34	1.62	4.24	.97	10.5	9.8	3.7
V	47	4.46	1.41	4.46	1.00	4.3	3.4	2.1
VI	137	3.97	1.73	3.99	1.00	3.7	5.8	1.5
VII	65	4.98	1.33	3.96	.79	1.5	18.5	3.1
VIII	70	3.28	1.92	3.72	1.13	2.9	11.4	2.8
IX	52	2.96	1.92	4.17	1.40	17.3	19.2	3.8
X	370	4.11	1.63	3.78	.92	6.8	7.8	1.9
XI	32	3.00	2.18	3.53	1.17	6.3	3.1	0.0
XII	91	3.83	1.78	3.13	.81	16.4	19.7	2.2
XIII	173	3.76	1.69	3.73	.99	6.9	7.5	3.5
XIV	71	4.18	1.45	3.83	.91	12.6	23.9	2.8
XV	363	3.98	1.51	3.58	.89	24.2	28.4	0.8
XVI	99	4.16	1.54	3.78	.91	15.1	25.3	2.0
XVII	224	3.61	1.82	3.87	1.07	14.7	18.3	26.3

TABLE 6

DATA AND INFORMATION ON PEST CONTROL AND NUISANCES ASSOCIATED WITH ON-SITE DOMESTIC SOLID WASTE STORAGE

Statistical area	Dwellings surveyed	No pest control (%)	Flies (%)	Rodents (%)	Cockroaches (%)	Odors (%)
I	56	12.5	8.9	1.8	8.9	0.0
II	206	22.8	2.9	4.8	9.7	0.5
III	476	49.7	3.4	6.9	14.1	3.2
IV	295	46.4	6.4	9.2	10.0	0.3
V	47	27.6	14.8	23.4	44.6	4.2
VI	137	24.8	11.7	28.4	35.0	5.8
VII	65	53.8	15.3	33.8	46.1	1.5
VIII	70	72.8	4.2	8.6	7.1	7.1
IX	52		3.8	13.5	23.1	0.0
X	370	34.3	7.2	17.8	28.9	4.6
XI	32	75.0	0.0	3.1	0.0	6.2
XII	91	63.7	16.4	3.3	22.0	2.2
XIII	173	23.1	1.7	1.7	9.2	0.0
XIV	71	19.17	8.5	8.5	23.9	0.0
XV	363	33.8	23.4	23.4	32.5	9.1
XVI	99	32.3	19.1	19.1	26.2	1.0
XVII	224	42.8	7.1	7.1	7.5	2.7

TABLE 7

ESTIMATED NUMBER OF PRIVATE INCINERATORS BY LAND USE IN THE DISTRICT

Taxable land use	Total in number	Percent with incinerators	Percent of total number of incinerators	Total number of incinerators
Apartments	9,200	37.2%	89.09%	3,420
Hospitals	17	100	00.65	25
Super markets	90	17.5	00.42	16
Hotels - motels	82	12	00.26	10
Offices	1,000	4	1.04	40
Restaurants	1,382	12	4.32	166
Public schools	200	65	3.41	131
Shops	700	3	00.55	21
Miscellaneous	1,000	1	00.26	10
TOTAL	13,671	N/A	100 %	3,839

B. ON-SITE REDUCTION

Grinding of garbage is the most commonly used on-site reduction method in the District. A garbage grinder is a device for pulverizing food waste for discharge into the sanitary sewerage system. In the foreseeable future a significant increase in the use of garbage disposal units is expected. The construction from urban renewal and Model Cities projects and from other new buildings with kitchen facilities will contribute to this increase. There is no expectation that grinding will be generally utilized as a disposal method for other solid waste, however.

The use of heavy duty compactors is increasing in the District of Columbia. The majority of the compactors are located at Department of Defense and other federal installations. It is believed that there are also many compactors located in high-rise apartment buildings.

Some solid waste collection companies utilized balers to volumetrically reduce salvageable items, e.g., cloth, paper, cardboard. Area warehouses of several major supermarket chains utilized heavy duty balers to compress and bind daily accumulations of cardboard boxes. Also, many department stores, office buildings and apartment buildings utilized balers for similar purposes.

C. ON-SITE DISPOSAL

Prior to this study, there was no reliable information on number, types and specifications of private incinerators installed in the District. Table 7 shows the distribution of incinerators by land use category. Approximately ninety percent of the private incinerators are installed in apartment buildings and schools. The other ten percent are located in hospitals, hotels, motels, office buildings, restaurants and supermarkets. Most of the private incinerators are located in high rise apartment buildings in affluent areas.

Generally, incinerator rooms or areas are readily accessible to unauthorized persons. Safety and operating instructions are not posted. Face masks and fire extinguishers are available only in a few locations.

In most cases the material incinerated in apartment buildings consists of mixed domestic refuse (trash and garbage) unless a garbage grinding unit is available. Even when these grinders are available, many tenants still mix garbage with the trash.

In order to estimate the total amount of solid waste combusted by private incineration, residue weighings were conducted at a representative number of premises in a ten percent random sample of each land use category. Based upon those weighings, the initial estimate was approximately 456 tons of solid waste daily. However, since approximately five percent

of existing private incinerators were not in operation, this figure may be five percent too high. The stringent new air quality control standards will have the effect of reducing the number of private incinerators in operation and thus increasing the quantity of refuse received at D. C. disposal facilities. Based upon surveys made in 1968 and 1969 (see table 8), it is estimated that the rate of discontinuation of the use of flue-fed and single chamber types of incinerators will be twenty-five percent during each of the first two years of the grace period, and fifty percent in the third year.

Compactors are installed in three hospitals in lieu of general refuse incinerators and have proven to be more efficient and economical. Some D. C. hospitals and new private medical facilities plan to use compaction equipment in the place of general refuse incinerators (see Chapter 2, Hospital Solid Wastes).

During 1962, regulations were passed which required that all newly constructed, installed or altered incinerators be equipped with multiple chambers or with combustion equipment that would substantially reduce gaseous and particulate emissions. The majority of the private incinerators, however, are still single-chambered or flue-fed and, therefore, play a key role in the contamination of the ambient air through particulate and gaseous emissions. Since the previous D. C. regulations had not provided effective air pollution control standards, the Air Quality Control Regulations were promulgated and put into effect on February 7, 1969. These regulations prescribe that the use of single-chamber and flue-fed incinerators will not be permitted after a three-year period. A similar grace period is provided for the modification and updating of current multichamber private incinerators to meet minimum emission standards.

III. CONCLUSIONS AND RECOMMENDATIONS

Many of the proposals recommended in Chapters 1, 2, and 4, will have the effect of improving conditions of on-site solid waste storage. The proposed ammendment to Article 21 (see Appendix A) will provide enforceable standards for solid waste containers. The proposed reorganization of the Health Services Administration will provide for more effective routine surveillance of on-site storage at premises in all land use categories.

Improvements in the collection service, by both the Department of Sanitary Engineering and the private collectors as recommended in Chapter 4, will reduce the volume of material stored on-site and thus will ameliorate many of the problems associated with storage. Nevertheless, citizen cooperation must be elicited to alleviate unsanitary conditions noted particularly in impoverished areas. Assuming that the "War on Rats" Program will be successful, most problems associated with the on-site

TABLE 8

ESTIMATED TOTAL NUMBER OF PRIVATE INCINERATORS BY TYPES AND PERCENT DECREASE IN USAGE DURING THE PERIOD 1968-1969

Type	Total number - 1968	Total number - 1969	Percent of total number of incinerators in D.C.	% decrease in usage
Flue-fed, single chamber	2,724	2,533	69.8%	7%
Direct fed, single chamber	614	596	16.4	3
Direct fed, one burner, single chamber	171	171	4.7	0
Direct fed, one burner, double chamber	168	168	4.6	0
Direct fed, two burners, double chamber	162	162	4.5	0
TOTAL	3,839	3,630	100%	

storage of solid waste should be minimized during the early years of the project. A more intensified effort toward educating the public to clean-up and maintain acceptable sanitary conditions may have to be in effect for a number of years in order to achieve the desired goals.

The following specific actions are recommended:

A. ON-SITE STORAGE

1. Initially, collection of all solid waste in the Model Cities and other problem areas regardless of whether it is in an approved container.

2. Initiate an environmental health educational campaign for residents of low and moderate income areas, to be followed by strict enforcement of the proposed solid waste regulations.

3. Evaluate and increase the frequency of collection as necessary after a test of the Department of Sanitary Engineering's twice weekly combined solid waste (trash and garbage) collection service.

4. Evaluation of the present issue of free or at cost trash cans to needy families under the "War on Rats" program to determine if this procedure should be continued and put on a city-wide basis.

B. ON-SITE REDUCTION AND DISPOSAL

1. Installation, in commercial and institutional buildings, of efficient reduction systems (e.g., compactors, balers, shredders, etc.) as replacements when the flue-fed and the single-chamber type incinerators are banned.

2. Inclusion in new solid waste legislation the requirement that garbage disposal units (grinders) be installed at the following:

a. All new construction of food service establishments and residential buildings.

b. All existing food establishments after a reasonable grace period.

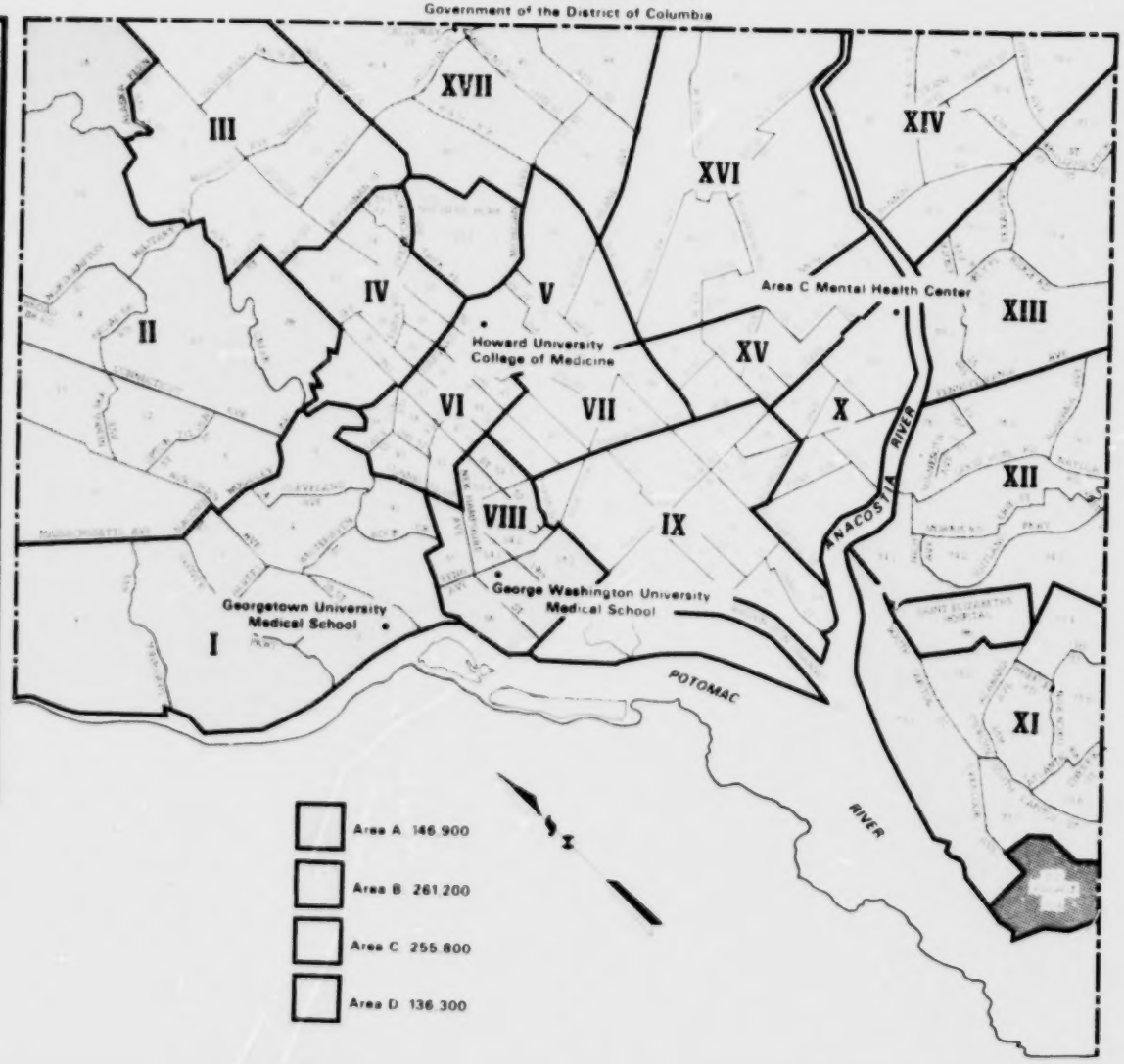
3. Provision and enforcement of safety regulations regarding private incinerators.

Health Service Areas

for Community Health Centers

DEPARTMENT OF PUBLIC HEALTH
Government of the District of Columbia

1964 Estimated		
TOTAL POPULATION		811,000*
AREA A		146,900
Statistical Area	I	52,300
	II	59,600
	VIII	35,000
AREA B		261,200
Statistical Area	III	59,400
	IV	65,000
	V	33,700
	VI	58,900
	XVII	44,200
AREA C		255,800
Statistical Area	VII	43,000
	IX	31,300
	X	39,400
	XIV	45,100
	XV	59,100
	XVI	37,900
AREA D		136,300
Statistical Area	XI	41,900
	XII	55,000
	XIII	39,400
*Inst. Population		10,460



CHAPTER FOUR. COLLECTION

I. INTRODUCTION

Approximately 700,000 tons of refuse is collected in the District of Columbia annually. Abandoned automobiles and demolition and excavation wastes bring the total annual solid waste accumulation to nearly four million tons as shown in Table 9.

More than one-half of the refuse is collected by commercial haulers. Demolition and excavation waste is generally collected by the contractors and owners who produce it as described in Appendix C. Several of the larger commercial enterprises use their own collection crews and equipment as do several government agencies (Appendix D) and, of course, some private individuals. This is expecially true of sporadically produced waste — including home carpentry and gardening, demolition and excavation. The identification, collection and disposal of abandoned automobiles are under the control of the Metropolitan Police Department, as described in Appendix E.

Table 13 shows the categories of solid waste collected by the D.C. Department of Sanitary Engineering in each of the six proposed sanitation districts, which are based on the six recently revised police precincts. This collection service is provided for residential buildings consisting of fewer than four dwelling units, for non-profit organizations, and for public property, such as municipal buildings, schools, D. C. parks and public thoroughfares, at a cost of over $8 million annually. As noted in Chapter 1, public law prohibits the use of municipal funds for the collection of any solid wastes other than garbage from commercial establishments. Tenements, rooming houses, and apartment buildings are also classified as commercial enterprises and as such must contract for or provide their own trash removal service. As mentioned in Chapter 1 of this report, there is little control exerted over these haulers.

Among other District of Columbia agencies collecting and transporting solid wastes are the Department of Highways and Traffic and the Sewer Operations Division of the Department of Sanitary Engineering. The operations of the latter are discussed in Appendix F.

The annual rate of production of refuse is relatively stable in the District of Columbia. Table 10 compares the quantities collected in FY 1968 to those in FY 1969.

Preceding page blank

TABLE 9. SOLID WASTE COLLECTED IN FY 1969

		Tons		Cu.Yds.
Department of Sanitary Engineering				
Trash Collection and Incineration Branch		127,385		1,019,080
Garbage Collection & Disposal Branch		24,348		48,696
Ash Collection and Special Service				
Household collections	7,571		60,567	
Special cleanup drives	862		6,890	
Trash D.C. Government buildings	5,275		42,207	
Public space and alleys	561		4,484	
Abatement of nuisances	981		7,855	
Dead animals	396		396	
Sub-total		15,646		122,399
Street Cleaning Branch				
Street Cleaning Sections	35,999		288,078	
Alley Section	6,635		53,078	
Sub-total		42,634		341,156
Department total		210,013		1,531,331
Other D.C. agencies		23,887		103,736
U.S. Government collections		34,895		249,094
Confidential material		1,520		12,160
Commercial collections		414,436		3,119,413
Commercial garbage received at Transfer Station		2,662		5,324
Garbage collected by farmers		18,000		36,000
Total refuse		705,413		5,057,058
Demolition*		520,000		520,000
Excavation*		2,700,000		1,800,000
Abandoned automobiles*		9,407		56,448
Total solid waste		3,934,820		7,433,506

* Estimates from special FY 1968 surveys.

TABLE 10. REFUSE COLLECTED IN FY 1968 AND FY 1969

	Tons	
	FY 1968	FY 1969
D.C. Department of Sanitary Engineering		
Trash Collection and Incineration Branch	127,455	127,385
Garbage Collection and Disposal Branch	27,347	24,348
Ash Collection and Special Services Branch	15,617	15,646
Street Cleaning Branch	37,007	42,634
DSE TOTAL	207,426	210,013
Other D. C. agencies	20,284	23,887
U. S. Government collections	35,063	34,895
Confidential material (incinerable trash)	1,788	1,520
Commercial forces, general refuse	400,255	414,436
Commercial garbage received at Transfer Station	2,849	2,662
Garbage collected by farmers	28,000	18,000
TOTAL	695,665	705,413

II. FINDINGS

A. MANPOWER UTILIZATION AND PRODUCTIVITY

1. Commercial and Private Collections

Over sixty percent of the refuse collected in the District of Columbia is collected by commercial haulers. Since commercial collection is made primarily from sites with a high rate of refuse generation—e.g., tenements, apartment buildings, office and commercial buildings — the use of on-site reduction, large containers, and mechanical material handling aids permits one-man collection crews to collect a large amount of refuse quickly and economically. In fact, the economies afforded by the use of advanced materials handling equipment enable six companies — out of over 100 commercial refuse collection organizations operating in the metropolitan area — to handle an estimated three-fourths of the total commercially collected refuse within the city limits. These companies

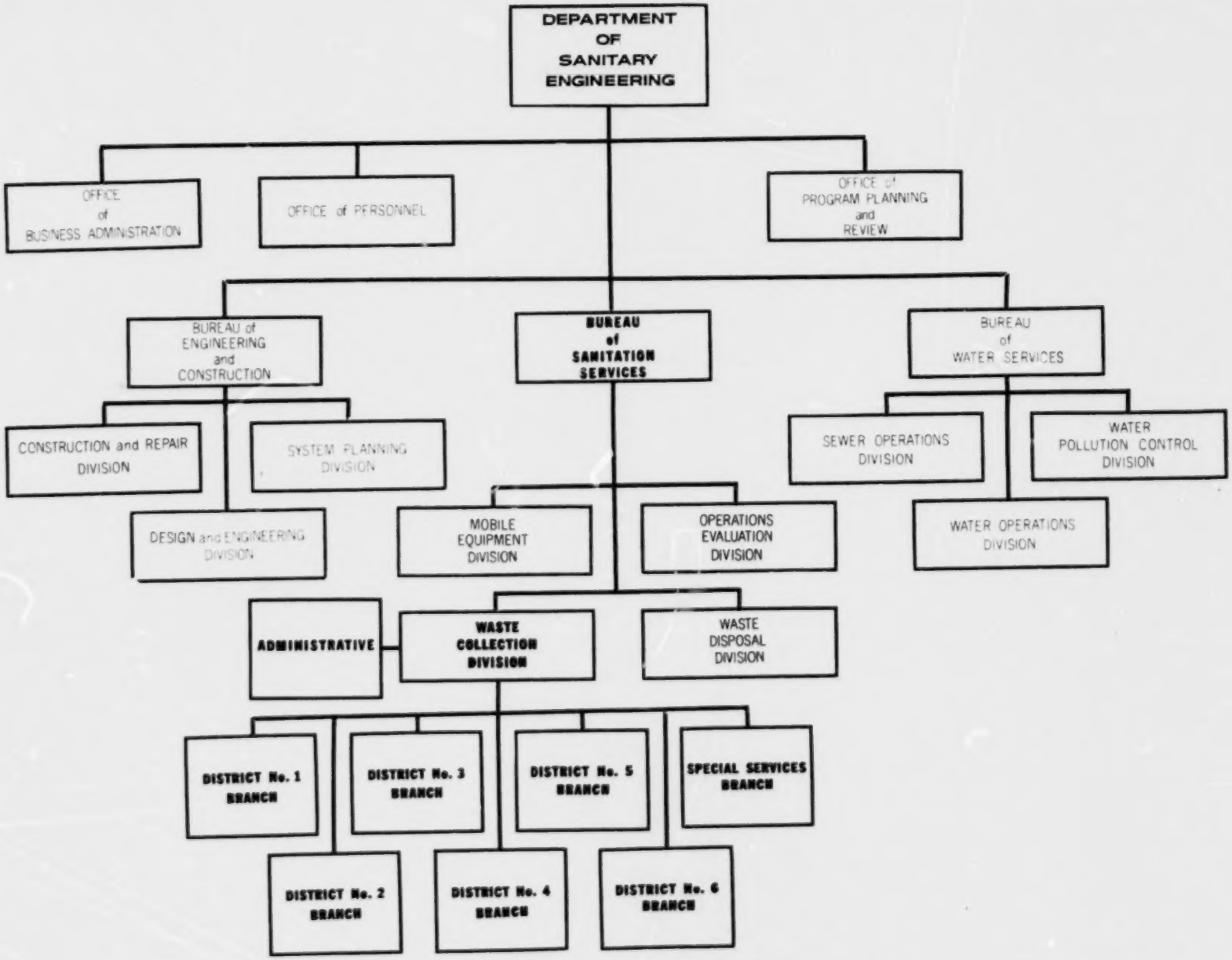


Chart 1.—Proposed Organization of the Waste Collection Division.

employ fewer than 300 laborers. One company limits its service to customers using hydraulically liftable containers of over one cubic yard capacity. Those companies giving more door-to-door service use a proportionally higher ratio of labor to tonnage collected. Most of the refuse generated at federal facilities, which also use predominantly large-volume containers requiring minimal manpower, is collected by commercial contract. Those federal agencies handling their own collections employ approximately thirty laborers in refuse collection. Commercial and federal haulers are further discussed in Appendix D.

Private garbage collectors bring to municipal disposal facilities over 2,500 tons annually. No cost figures are available on the collection and transportation of this material, but at the present Bureau of Sanitation Services cost per ton they would amount to over $100,000.

Some garbage generated within the District of Columbia is collected by hog farmers. This quantity is estimated at 18,000 tons or 36,000 cubic yards per year. However, outbreaks of hog cholera have curtailed the practice of allowing farmers to pickup garbage at the Transfer Station, and this practice should not be resumed.

2. Collections Made by the Bureau of Sanitation Services D C. Department of Sanitary Engineering

When this study began, the bureau was then a division and was organized into branches, each responsible for a particular waste handling function on a city-wide basis. During the study period, a reorganization, as shown in Chart 1, was initiated and in part implemented. Collection procedures are being changed from city-wide collection by type of refuse to area collections of all types of refuse. In addition, the bureau has begun to collect combined trash and garbage and is replacing open body trucks with packer trucks. As this study is being completed, the area-based system is in operation in only one of the six proposed sanitation districts while the five - branch functional collection system is still in use in the rest of the city. (Appendix H presents the proposed organization of the future collection branches.) Four of the functional branches are directly involved in the collection of solid waste, the fifth is a support branch. Each branch is headed by a chief who is responsible to and reports directly to the chief of the Bureau of Sanitation Services.

The bureau employs 1,690 persons for the handling of solid wastes. Of this number, 1,195 are laborers and drivers directly involved in the collection of solid waste, 175 in equipment repair and maintenance, and 52 in administrative and clerical positions. The remaining 268 are employed in disposal services. The number of laborers directly employed in waste handling and the quantities collected by each branch are shown in Table 11.

The total manpower cost during FY 1969 for the collection of solid waste by the bureau was $8,138,230. The cost per ton by branch is shown

TABLE 11

BUREAU OF SANITATION SERVICES

COLLECTION PERSONNEL AND QUANTITIES COLLECTED - FY 1969

Branch	Number of workers	Quantities collected (tons)
Trash Collection and Incineration	306	127,385
Garbage Collection and Disposal	105	24,348
Ash Collection and Special Services	87	15,646
Street Cleaning		
Street Section	348	35,999
Alley Section	40	6,635
Mechanical (drivers)	309	-
TOTAL	1,195	210,013

TABLE 12 - LABOR COSTS AND PRODUCTIVITY, FY 1969[1]

Function	Annual labor cost	Quantity collected (tons)	Labor cost/ton	Total cost/ton[2]	Labor cost/ % of total cost
Trash collection	2,589,120	127,385	$20.33	$23.66	85.9
Garbage collection	991,470	24,348	$40.72	$47.80	85.2
Ash collection	765,410	15,646	$48.92	$57.08	85.7
Street cleaning	3,792,230		$88.95	$105.94	84.0
street section		35,999			
alley section		6,635			
TOTAL	8,138,230	210,013	$38.76	$45.66	84.9

[1] Annual Financial Statement and Summary of Expenditures of the Sanitation Division for the FY ending June 30, 1969

[2] Includes wages of collectors, operating costs of facilities and equipment, and salaries of supervisory personnel directly responsible for the particular collection service.

in Table 12. Drivers received a median of $3.30 per hour, while the median salaries for laborers and labor leaders were $2.94 and $3.23 respectively. The wage range for foremen was $3.87 to $4.73. These figures are presently being modified and will be slightly higher by the time this report is published.

a. Organization

Under the existing organization as shown in Chart 2, each of the four present collection branches has specific responsibilities leading to different management structures.

(1) Trash Collection and Incineration Branch

The branch office consists of the chief, his deupty, the assistant chief for incineration and the assistant chief for trash collection. The office force is made up to two clerk typists, two record clerks, two timekeepers and a clerical aide.

There are 52 trash collection crews. Crews on packer trucks consist of a labor leader, two laborers and a driver. Crews on open body trucks consist of a labor leader and three laborers and a driver. These 52 collection crews are grouped into seven sections serving the seven geographical areas shown in Appendix G. Each section is headed by a foreman supervising seven or eight crews and is subdivided into routes. Each crew is assigned a daily route for a total of 260 routes to cover the entire city — an estimated 135,000 dwelling units — once a week on a five day basis, resulting in a total annual manpower input of 13,520 crew-days. The branch annually collected 130,000 tons of refuse; the collection average is ten tons per crew per day. A separate section has been established as a labor pool of thirty-five laborers to provide substitutions for absent crew members in the seven regular trash collection sections.

(2) Garbage Collection and Disposal Branch

The garbage collection operation is presently organized parallel to but independently of trash collection. The Garbage Collection and Disposal Branch is led by the branch chief and his deputy assisted by one clerk. There are five collection sections with three to five crews serving 11 to 13 routes per section. Twice a week collection is given to 60 routes, requiring 480 man-days per week. The operational boundaries of the five sections are shown in Appendix G.

(3) Ash Collection and Special Services Branch

The collection of household ash and bulky objects, collection services for public buildings, cleaning of vacant lots, and other special services, are performed by the Ash Collection and Special Services Branch. It it led by the branch chief and a deputy, assisted by two clerks.

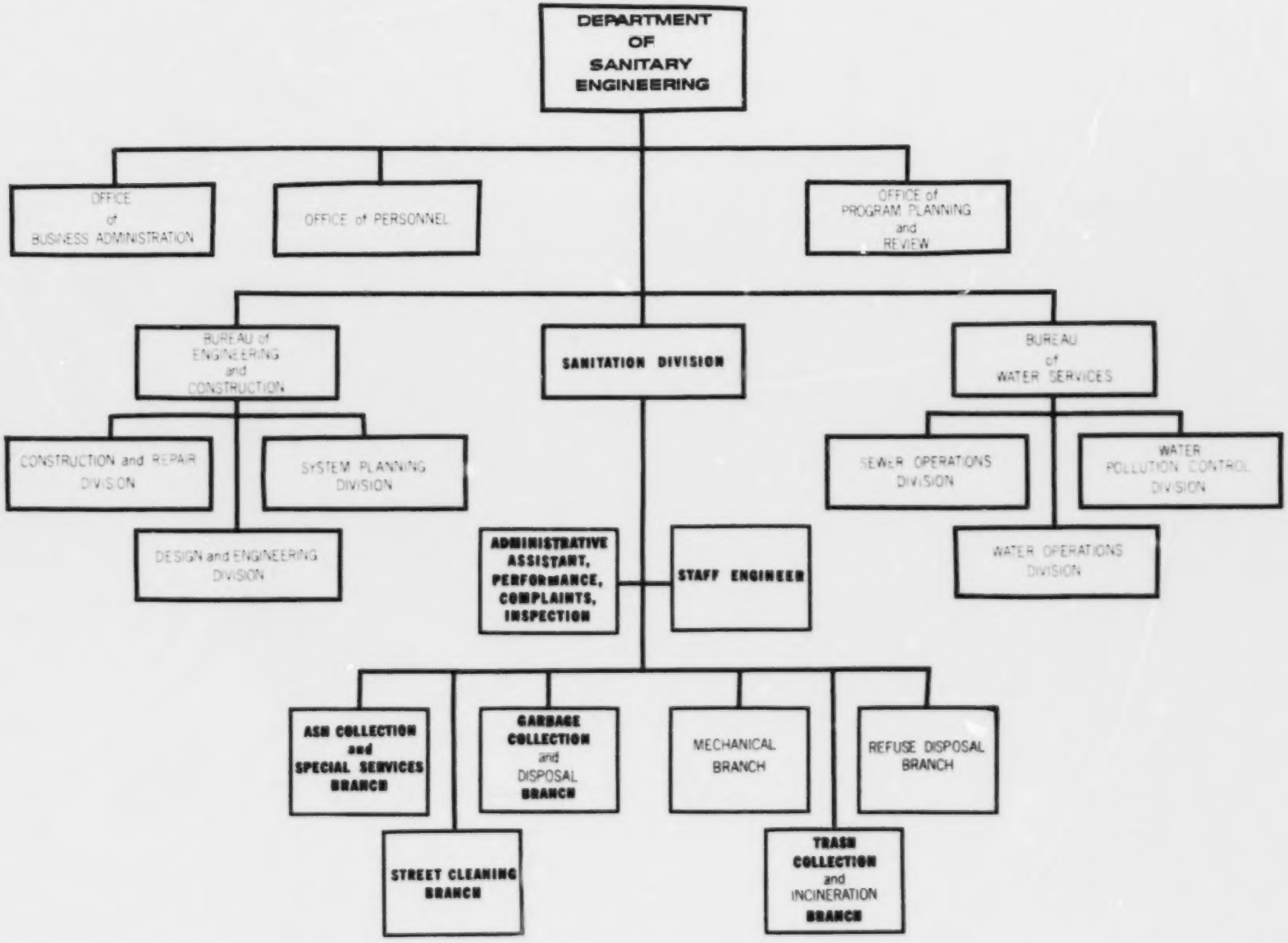


Chart 2.—Former Organization of the Sanitation Division.

There are five sections, each headed by a foreman and assigned an area of the city for route collections as shown in Appendix G. Each of these sections has fifteen crews of four men using open-body trucks. Special crews are also assigned to these sections to operate such equipment as packers for school and public building services, vacuum trucks and chippers. A sixth section has no area assignment but serves the entire city for abatement of nuisances and for special cleanups. Its full complement is eight crews of which it presently has two.

(4) Street Cleaning Branch

The Street Cleaning Branch, charged with the responsibility of cleaning public thoroughfares, is led by the branch chief and two deputies. It consists of 14 street cleaning and three alley cleaning sections with a foreman and from 10 to 40 men assigned to each section. The 14 street cleaning sections have 348 laborers to cover 207 pushcart routes and 45 truck crews. The three alley cleaning sections have 40 men in 12 crews. Laborers serving cart routes report to foremen or labor leaders at tool houses located in the vicinity of their route. Routes are designed to begin and end as near the tool houses as possible. Considerable delay was noted between the time the laborers report for work and the time they actually begin to work. Absenteeism, typically a problem in refuse collection services, is especially critical when it occurs among these cartmen, whose absence requires extensive route rearrangement and results in less effective coverage.

Most of the street refuse is collected by laborers using hand brooms and shovels. The litter collected by these cartmen is deposited at designated locations for pickup by truck crews. The daily coverage for cartmen is a function of the land use, the population density, the season of the year, and whether or not the sidewalks and tree boxes require cleaning. The daily coverage for cartmen in high intensity commercial areas where sidewalks must be swept is 3.1 miles.

Truck crews are assigned regular street cleaning tasks. Since they are mobile, they are assigned to scattered areas with high intensity of litter and to areas where regularly scheduled cartmen are absent. The use of truck crews for street cleaning has many built-in inefficiencies in comparison to the use of cartmen. The truck bodies are higher and require more time and effort to load. The driver does not assist in loading. The loaders spend considerable time waiting for each other and for the truck. A study showed that under similar conditions cartmen perform the same task with a small fraction of the equipment cost and 40 percent less labor expenditure.

The pushcart deposit points and the litter baskets are generally adjacent to household or public building waste collection routes. Collections at most of these points could be scheduled on those routes.

Mechanical sweepers are used except in freezing weather; they require only one individual and are probably the most effective street cleaning method.

Leaf vacuuming trucks are employed in the fall in areas of high tree density. These are operated by a crew of four men: a driver, labor leader and two laborers. The laborers precede the truck, sweeping leaves from tree boxes and from between parked cars. The vacuum hose is operated by the labor leader.

Separate accounting of amounts collected by truck crews, cartmen and mechanical sweepers is not maintained. The branch collects 42,600 tons annually. Cartmen clean 100 feet of curb in five minutes in a residential area with heavy leaf accumulation. Four-man truck crews clean 100 feet of curb in seven man-minutes under similar conditions. The mechanical sweepers can generally average about 20 miles per day, or 100 feet of curb in 0.44 minutes.

b. Productivity Factor

(1) Task System

The trash and garbage collection crews are on a task system. Under this system routes are designed for a full day's work. The work day is ended upon completion of the assigned task. This system has the advantage of inducing the workers to maintain a fast and steady pace and to load trucks to capacity before going to the disposal facility, and it is a good morale factor. The system may induce haste occasionally at the expense of safety and equipment maintenance, and would be a factor in the number of missed stops and complaints. The street cleaning and special services branches of the bureau have functions which are harder to define and supervise. For this reason, assignments are not made on a task basis, but on the conventional eight hour day. However, as reorganization proceeds under the area concept, street cleaning and special collection functions may be assigned on the task system basis. Performance standards are presently being evaluated for these functions.

Under the task system for trash and garbage collection, the assigned work load required about 80 percent of the normal eight hour day during the study period. An analysis of reported time in the field over a three month period revealed that 39 percent of the routes required between six and seven hours to complete with 35 percent requiring less than six hours and 26 percent requiring more than seven hours.

(2) Collection Practices

Standards are not uniform in establishing the location of household storage points throughout the city. In fact, in many instances they are not uniform within the same block. The collection points should be adjacent to the public space in areas accessible to the collection

crews. However, a variety of collection points was found: some convenient to public access and others in garages, under front steps, next to buildings and behind buildings.

On-site storage regulations have not been effectively enforced. Approximately 30 percent of all households serviced do not have adequate legal container capacity and require supplemental space in cardboard and paper containers. This practice attracts rodents and insects, induces spillage, and is unattractive; it is time consuming and introduces a safety problem for the collector. While the practice will not be eliminated, enforcement and public education programs should reduce it considerably.

As shown in Chapter 3, On-Site Solid Waste Handling, regulations governing the standards for containers (construction material, volume and loaded weight) are poorly enforced; moreover, many of the otherwise legal containers are broken, mashed and bent to such a degree that they are dangerous for the men to handle.

A recent development in containerization which speeds up collection and improves the condition of storage sites is the use of polyethylene disposable bags. An analysis showed that these disposable bags amounted to five percent of the total number of containers used in the District.

A study of the collection crew's time showed that one-half of its productive time is spent handling containers, and that one-half of this handling time is spent emptying cans and returning them from the truck to the pickup point. A complete change-over to the use of these one-way containers could result in an hour saved per crew-day.

Complaints for missed pickups, special requests and new services are received at the bureau headquarters. They are transmitted to the foremen who inform the appropriate crew and insure that the collection is made. If the collection was not made because the container or the point of collection was not acceptable, the foreman will explain this to the resident.

(3) Personnel Practices

Foremen in the field recruit men on referral from their laborers; men seeking employment approach their neighborhood foremen. This approach provides an effective pool from which qualified men may be selected. While the evaluation of potential laborers should be made by foremen, some degree of centralization may be warranted. Screening should be made consistent throughout the bureau to complement the probation system. The ratio of the number failing probation to the number of new hires in FY 1969 was 1 to 6, not including those who resigned to avoid being fired.

The average tenure of laborers engaged in trash and garbage collections is six years. However, as of August 1969, approximately 30 percent of the force had been employed for less than one year, indicating that there is a significant number of longer term employees.

The training program for the collection function is being improved: a department-wide course for foremen has been established, safety training has been strengthened, and training for collectors in connection with the reorganization under the area concept is being conducted.

(4) Route Design

The 1195 sanitation laborers and drivers engaged in the daily collection of refuse are detailed in independent crews or singly to the approximately 750 collection routes and street cleaning assignments throughout the city. Thus, on the job supervision is minimal and effective performance of collection assignments requires that jobs be well planned in both scope and methods. In this regard, present route designs are now being revised.

B. METHODS

The regulatory and the operational departments of the D.C. Government, in their role of protecting public health and safety, place few restrictions on solid waste collectors regarding collection methods. These methods are largely a function of the type of collection vehicle; restrictions on the type of vehicle, however, are virtually non-existent. There are presently in effect municipal standards for garbage and dead animal collection vehicles as described in Chapter 1, but the vast majority of these is operated by the bureau. Thus, most of the commercial fleet remains unaffected. Competition for business is the only incentive to improve collection methods.

The area's more progressive commercial hauling firms are using methods as modern and effective as are industrially available. These methods are more competitive in large volume handling. The commercial handling of household refuse in which door-to-door collection is involved can be competitively performed by those firms which are able to retain their competitive prices by use of marginal methods.

The collection methods used in the city by federal agencies are compatible with public health and safety standards. Some packer trucks are in use and the type of material collected is generally easy to handle. Those agencies which perform their own collections handle only paper wastes and floor sweepings. Garbage and industrial wastes are generally handled by commercial concerns under contract.

Private citizens generating sporatic but bulky accumulations of refuse from gardening, home carpentry and other occasional pursuits used private vehicles or rented trucks to collect this debris and transport

it to disposal facilities. Random sampling at the landfill shows that fifty to seventy-five automobiles per week haul to authorized disposal areas; the amount of waste hauled, however, is small.

Chapter 1, Laws and Regulations, describes the proposed legislation necessary to control the methods of all refuse collectors including commercial, federal and private, insofar as their actions affect the public health.

The methods employed by the Bureau of Sanitation Services in providing collection service will be discussed below for each of the following types of services: household, schools, public buildings, dead animals, and street cleaning.

1. Household

At present, domestic wastes (trash, garbage, ashes, and bulky objects) are collected by three branches, Trash, Garbage, and Ash and Special Services. Trash is collected once a week; garbage twice a week; weekly ash collections and special pick-up of bulky objects are scheduled upon request.

The service rendered is a function of the neighborhood housing pattern. Row houses, town houses, houses with fencing, and other single family units whose rear yards are inaccessible, are given curbside collection only. In blocks with wide enough alleys, the trucks drive through the alleys and the loaders collect from backyard storage points. Special situations, such as residences of the infirm and elderly, are provided collection at the point of storage. In such cases, garbage is transferred from the resident's container into a can carried by the collector. Two or three houses may be serviced by the collector before he returns to the truck. Similarly, trash is collected in burlap containers which are carried to the curb for loading. Where convenient, the crew will split, allowing part of the crew to travel ahead and prepare the route by setting-out or by burlapping. This procedure may continue while the truck is unloading or making alley collections. A collection route often comprises a variety of these situations.

In alleys and low density residential streets, both sides are collected simultaneously, crews crossing the street to the truck. This is more frequently the case for garbage collectors, since volumes per household are less and more collections may be made before returning to the truck. On wider, more heavily traveled streets, foremen require that the sides be collected one at a time.

Household ashes and bulky objects are collected by the Ash Collection and Special Services Branch. The service is performed upon the resident's request for either a special collection of bulky items and appliances or scheduled service. Collection routes are defined by boundary and date,

but are not formally set up with listed stops. Instruction for frequency and coverage are not logged.

Household ash collection is now one of the lesser functions of the branch; however, there are still approximately 500 collection points receiving weekly service during the winter months. The branch also makes a special Christmas tree collection.

The Ash Collection and Special Services Branch collects 7,500 tons of special household refuse annually. A study during calendar year 1968 showed that this included 5,100 appliances (2,000 refrigerators, 1,700 washers, 1,400 stoves and water heaters). The Garbage and Trash Branches collects a total of 150,000 tons. This figure includes a small amount of trash from nonprofit institutions and garbage collections from commercial sources.

2. Schools and Public Buildings

Municipally owned buildings are served by the Ash Collection and Special Services Branch. Collections are made from regular pre-established points at all D.C. buildings. This refuse consists of trash, furnace ashes and incinerator ashes. The frequency of collection is variable and depends upon the material collected, storage space on-site, and generation rate. Some collections are made semi-weekly, others only upon request.

The method of collection from several of the older public school buildings is to raise singly each 32 gallon container from the basement of the buildings with a winch. This is a slow, inefficient operation requiring considerable time per can. The only on-site reduction method presently being used is incineration.

Five to six thousand tons of trash are collected annually from schools and public buildings. This amount comprises 40 percent of the branch's total collection. An additional small amount is collected from these sources by the Trash Collection and Incineration Branch crews when their domestic routes include small D.C. buildings such as fire and police stations.

3. Street Cleaning

As described on page 40 under Manpower, both manual and mechanical street cleaning methods are employed. The cartmen clean streets, curbs and gutters with push brooms. Bureau responsibility does not include cleaning the sidewalks or the tree boxes. However, in practice, any accumulations in these areas are swept up. The pushcarts are being converted for use with disposable paper bags, which will eliminate the problem of leaving loose refuse in the designated deposit areas for truck crew pickup. Some truck crews are assigned areas to clean early in the

TABLE 13

AMOUNTS OF SOLID WASTE AND DISTRIBUTION OF PERSONNEL WITHIN THE COLLECTION AREAS
BUREAU OF SANITATION SERVICES (FY 1968 Data)

Area no.	Personnel	Street cleaning Hrs/wk	Street cleaning tons/yr	Garbage collection Hrs/wk	Garbage collection tons/yr	Trash collection Hrs/wk	Trash collection tons/yr	Ash and Special services Hrs/wk	Ash and Special services tons/yr	Total hrs/wk	Equiv. men	Total tons/yr
1	Foremen	191	6,920	66	3,432	49	12,159	88	2,697	394	9.85	25,208
	Leaders	462		126		198		185		971	24.28	
	Laborers	3,996		238		533		37		4,804	120.10	
	Drivers	462		126		198		181		967	24.18	
2	Foremen	104	7,579	54	2,774	93	23,190	62	3,241	313	7.83	36,784
	Leaders	379		101		378		132		990	24.75	
	Laborers	2,608		191		1,017		264		4,080	102.00	
	Drivers	379		101		378		132		967	24.75	
3	Foremen	83	3,769	51	2,682	41	10,121	27	1,664	202	5.05	18,236
	Leaders	261		98		165		69		593	14.83	
	Laborers	1,902		185		444		138		2,669	66.73	
	Drivers	261		98		165		69		593	14.83	
4	Foremen	104	8,832	127	6,631	141	35,143	83	3,395	455	11.38	54,001
	Leaders	548		243		573		134		1,498	37.45	
	Laborers	1,780		459		1,542		267		4,048	101.20	
	Drivers	548		243		573		134		1,498	37.45	
5	Foremen	120	5,167	129	6,763	117	29,203	49	3,109	415	10.38	44,242
	Leaders	412		247		478		130		1,267	31.68	
	Laborers	2,158		466		1,282		261		4,167	104.18	
	Drivers	412		247		478		126		1,263	31,58	
6	Foremen	78	4,740	97	5,065	71	17,639	27	1,511	273	6.83	28,955
	Leaders	418		185		288		62		953	23.83	
	Laborers	1,186		349		774		124		2,433	60.83	
	Drivers	418		185		288		62		953	23.83	
	Total tons of refuse		37,007		27,347		127,455		15,617			207,426

morning and for the remainder of the day collect from public litter boxes and from the cartmen's designated points of deposit. Others spend the entire day cleaning streets.

Mechanical sweeper routes are established in several sections of the city. Experimental areas have been set up to aid sweeper efficiency by providing parking on alternate sides of the street to be cleaned. Evening use of the sweepers was curtailed as a safety precaution after several drivers were attacked. The operation is severely limited by freezing and other unfavorable conditions.

The streets in business areas and other areas of high litter generation are to be cleaned daily while secondary streets are to be cleaned two or three times per week. Outlying areas and areas from which few complaints are received often experience six month intervals between cleanings.

In actual practice, the number of complaints and the rate at which the litter accumulates override the established cleaning frequencies and determine the allocation of men. Those streets cleaned twice per day are generally in critical areas from which many complaints are received. Table 14 shows the amount of refuse collected and the miles of street in each section.

Alleys are cleaned as often as three times per week, either because of heavy litter or in response to complaints. Alleys requiring less attention are cleaned less frequently.

Control over the cleaning of streets and alleys is maintained by the foreman subject to the approval of the branch chief. Log books and check-off sheets are maintained indicating areas which were not cleaned according to schedule. Entries are made noting the date of cleaning in the infrequently scheduled locations. Check-off sheets are used to keep records of the areas cleaned by alley crews, flushers, sweepers, vacuum trucks, and for work done on weekends.

Leaf collection, a seasonal function from October through December, is a function of the Street Cleaning Branch. It disrupts the normal street cleaning activities and requires special equipment and collection procedures. Special leaf-vacuum trucks as well as other street cleaning equipment are used for leaf collection.

The major leaf producing sections of the city are in street cleaning sections 5, 6 and 9. Those areas in which most leaves accumulate are scheduled for cyclic collection on a three week interval during the season. In the other city areas leaves are collected by street cleaners on the same basis as litter. (See Table 14)

Leaf-vacuum crews and open-top truck crews are used in those areas of heaviest leaf accumulation. The vacuums are served by three man crews

TABLE 14

FY 1968 STREET CLEANING QUANTITIES

Street cleaning section	Miles of streets	Total collections cu.yds.	cu.yd/mi	Leaf collections cu.yds.*
1	44	12,640	287	248
2	47	13,311	283	298
3	23	10,365	450	182
4	58	13,820	238	0
5	139	37,248	268	17,238
6	87	26,690	307	10,454
7	40	13,028	326	162
8	59	16,380	278	1,306
9	141	33,384	237	10,626
10	44	7,772	177	124
11	129	17,814	138	2,017
12	114	12,594	110	2,149
13	61	13,204	216	584
14	144	22,168	154	2,658
Total	1130	250,418	212	48,046

* Compacted quantities.

plus driver. The two laborers rake leaves from tree box spaces and from between parked cars. The labor leader operates the vacuum hose.

Column 4 in Table 14 shows the total compacted volume of leaves collected by special leaf crews; the figures are from a special study done in FY 1968. Data on FY 1967 and FY 1969 street cleaning are very similar to FY 1968, suggesting that 50,000 cubic yards is a typical annual volume.

4. Other Collections

Over 500 tons of refuse is collected from public space and alleys be crews from the Ash Collection and Special Services Branch. The abatement of nuisances results in the collection of 500 to 1,000 tons annually. Vacant lots, abandoned and condemned buildings, and littered areas are cleaned in response to Commissioner's Orders from the Executive Office of the city. This work is done on a reimbursable basis; the cost of the service is added to the owner's property tax.

Collections of the refuse resulting from cleanup campaigns by civic and other organizations ranges from 800 to 1,500 tons. Both the ash and trash branches participate in this collection.

Dead animal collection is handled separately. Requests are received from sanitation foremen, police, citizens, laboratories, and the National Zoological Park. Collected carcasses are refrigerated until picked up by a local rendering company. Approximately 40,000 carcasses are collected annually. Cost figures were not tabulated separately for this function. However, since there are four men with assigned vehicles it is estimated that the cost is about $30,000 per year.

C. EQUIPMENT

The lack of control of solid waste handling in the District has permitted a wide variety of collection equipment. Modern packers work alongside flat bed trucks converted by the addition of makeshift sides. There is no reliable estimate of the number of vehicles serving the city. The six major commercial haulers report the use of an aggregate of 118 trucks within the city limits. It is expected that those smaller companies which use less efficient trucks expand this number considerably. Federal agencies use nine open trucks and nine packers for nonconfidential waste collection within the city.

The Bureau of Sanitation Services owned 543 pieces of automotive equipment in November 1969. Of these, 270 were collection vehicles including 52 packers and 141 open dump trucks. Seventy-five are administrative vehicles and the remainder are miscellaneous categories including repair vehicles, trailers, salt spreading equipment and disposal equipment. Sixty-two packers are on order for FY 1970 purchase. Table 15 lists the equipment used by each branch, its age and mileage.

TABLE 15

AUTOMOTIVE EQUIPMENT BY TYPE, AGE, AND MILEAGE
FY 1969

Number	Type of vehicle	Average age/yrs	Mileage
	General service & maintenance		
1	Tanker	1	4,497
38	Passenger cars	3	364,453
68	Jeeps & pickups	4	485,183
2	Wreckers	4	8,227
1	Bus	8	1,221
4	Stake body truck	14	8,438
1	Compressor truck	16	604
	Street Cleaning Collection		
28	Sweepers	1	50,220
6	Packers	1	34,247
1	Vac-All	2	6,667
7	Self-loaders	2	33,790
10	Flushers	3	74,875
6	Truck-mounted vacuums	3	25,730
85	Open-body trucks	6	655,496
	Trash Collection		
42	Packers	1	121,795
28	Open-body trucks	3	319,672

TABLE 15

AUTOMOTIVE EQUIPMENT BY TYPE, AGE, AND MILEAGE
FY 1969
(cont.)

Number	Type of vehicle	Average age/yrs	Mileage
	Garbage Collection		
26	Open-body trucks	9	232,727
1	Semi-truck w/2 trls.	14	6,743
	Ash Collection		
4	Packers	1	6,181
4	Dead-animal trucks	1	12,597
25	Open-body trucks	7	181,532
1	Ash puller	13	6,787

The bureau's FY 1968 financial report shows that an average of $189.89 was spent for fuel and an average of $687.86 spent on repairs for each of the fuel consuming vehicles while FY 1969 reports as shown below indicate $200.94 spent for fuel and $592.95 for repairs. Thus, the average cost per fueled unit is just under $800.

Type of equipment	Units	Fuel costs	Repair costs	Total cost
Vehicles, gasoline operated	446	$103,807.57	$283,172.78	$386,980.35
Miscellaneous equipment, gasoline operated	55	495.08	16,231.87	16,726.95
Miscellaneous diesel operated	28	1,995.97	14,265.26	16,261.23
Total operated	529	$106,298.62	$313,669.91	$419,968.53
Average per unit		$200.94	$592.95	$793.89

The average age of all automotive equipment in FY 1969 was 6.45 years. Sixty percent of the non-packer truck fleet was over six years old.

Since these vehicles spend a great deal of time idling or driving slowly, a true measure of their utilization is not reflected in their mileage records. The Preventive Maintenance Section is analyzing vehicle oil samples to provide a more accurate method of measuring vehicle utilization, in order to improve the overhaul and repair schedule.

Cost records are kept on each vehicle. They are reviewed by the head of the Production Control Unit and all unusually high repair or operating costs are referred to the chief of the branch for his review and action.

The Mechanical Branch continually reviews vehicle types and specifications used within the bureau and recommends necessary changes. It is responsible for drafting detailed specifications for procurement purposes. For instance, it has redesigned the residue trucks to triple their volume. The branch has also been instrumental in improving the design of open trucks purchased for collection, lowering their height and widening their beds to allow for increased capacity. Equipment color is being changed from gray to white in an attempt to improve visibility, safety and public image.

The bureau is in the process of changing from open-body trucks for household waste collection to packer units. Both types are presently 16 cubic yard capacity, although five 20 cubic yard packers are on order. Garbage trucks used in household collection are equipped with sliding metal covers. These trucks will be phased out as the bureau proceeds in its change to combined collection of garbage and trash.

The packer trucks delivered 14,400 loads during FY 1969 averaging 7,900 pounds per loader. Pounds per loader per hour on packer trucks is 1,140 compared with 740 for open-body trucks.

The Maintenance Branch is responsible for the repair and maintenance of all the mobile equipment used in refuse collection. There are three levels of branch activities: minor repair, preventive maintenance and major repair. Inadequate facilities and understaffing are common to all three. Major repair and preventive maintenance each have one central facility. Minor repairs are performed at three separate garages. Minor and preventive work is scheduled for evenings as much as possible so as not to interfere with equipment usage.

The preventive maintenance program is effective in prolonging the life of mobile equipment. Crews perform preventive maintenance according to the following schedule unless oil analysis indicates that attention is needed.

Equipment type	Operating time
Sweepers	5 days
Flushers (16 hr. duty)	5 days
Flushers (8 hr. duty)	15 days
Packer trucks	5 days
All other equipment	41 days

Complete inspections are scheduled at 6,000 mile intervals unless greater frequency is suggested by the oil analysis. Mobile equipment in poor mechanical condition is sent to the Major Repair Section. The major repair facility is a heavy duty automotive repair shop capable of handling all equipment used in the various branches. All major repairs are done in this section — engine rebuilding, fabrication of needed items, body repainting and body work.

The projected annual replacement cost is $500,000 for collection equipment. When disposal equipment, snow, and miscellaneous categories are added, plus projected inflation and cost increases, the total annual replacement cost is $1 million.

III. CONCLUSIONS AND RECOMMENDATIONS

Many of the issues raised in the preceding pages of this chapter are problems for which active programs of correction have already begun. The problems regarding commercial and private collectors are largely ones of control. Remedies were discussed in Chapter 1; the chief recommendation is that the District exercise control through a vehicle licensing and inspection system. This report endorses the recommended regulations and their effective enforcement.

During the course of the study, the Department of Sanitary Engineering started the implementation of the previously planned reorganization of the municipal solid waste collection forces based on a concept which holds a particular supervisor responsible for all solid waste collection within a defined geographic area. This establishment of the accountability of supervisory personnel is expected to be very beneficial and is fully endorsed.

This type of organization lends itself to physical decentralization. Operational facilities, insofar as practicable, should be located within the sanitation district with consideration given to future expansion and neighborhood compatibility.

A. MANPOWER

Manpower utilization and productivity is expected to be greatly improved under the area-based system of control, since it allows flexibility in allocating the available manpower according to task requirements. The background of future supervisors will be broadened since each man will become familiar with the total operation. Supervisory talents will be utilized to fullest advantage by providing foremen with sufficient clerical staff within each district.

Qualification procedures need review to insure that they are in operation, are standard, and are realistic. Encouragement should be given to collectors to take self-improvement courses to prepare themselves for promotion.

Active recruiting should broaden the base of applicants, permitting more selectivity. The establishment of a formal waiting list should be evaluated; it provides a screening technique to hinder those seeking short periods of employment, and tends to make employees value the employment more. The rehire of former employees is another area in which study may prove beneficial. The men in this group do have a knowledge of the tasks so require little or no additional training.

Training programs are particularly important for the effective operation of the bureau. Areas for training should include:

1. Orientation
2. Safety
3. Job skills
4. Interpersonal relationships: union - worker - management, worker - public, etc.
5. Promotion, advancement, leadership
6. Basic needs of urban existence such as communication skills, consumer judgment.

Each position should be reviewed to establish that it has potential for advancement. Consistent standards should be established and applied for promotions in conjunction with the newly enacted merit system. This system will improve the chances for merit promotions, but it needs care in implementation to insure that a proper balance is maintained which retains full use of the judgment of foremen yet fosters employee faith in the system's fairness.

B. METHODS

Proposals for improvement of methods must include:

1. Periodic analysis and review of methods to determine changes in workloads, deficiencies and requirements.

2. Establishment of a program of orderly development of effective management and administration on a city-wide basis.

3. Establishment of effective scheduling and dispatching of personnel and equipment.

Improvements in the methods of handling solid waste could reduce manpower requirements of the present services thus freeing men for more thorough coverage and increased collection frequency. For example, cooperation with the schools has resulted in the consideration of changes to solid waste handling systems which will greatly increase efficiency. This type of study should be made in all instances where the volumes handled provide opportunities for savings due to on-site reduction and mechanization.

Improved organization and management controls are to be developed for more effective collection of solid waste as shown in Appendix H. As the area-based system of control is effected, selection of areas, design and installation of routes, development of management information requirements, and development of a set of standards defining the adequacy of collection and cleaning within an area will be accomplished.

Staffing and route designs will be developed to cover all types of solid waste collections. Appendix I shows the methods and techniques to be followed.

Participation of the private sector in the planning and establishing of changes in methods and system for municipal management of solid waste handling should be continued and expanded. This participation would be valuable to the bureau as a means of allowing direct comparison of the detail of such techniques as equipment handling methods, repair, supply and bookkeeping. Conferences and other appropriate information exchange should be developed in the formulation and amendment of standards and regulations for the industry and to foster their cooperation and professional attitude.

C. EQUIPMENT

A thorough analysis should be made of the fleet and of the fleet maintenance facilities. The vehicle analysis should include not only maintenance and operating costs for each type but also production limiting factors such as compaction, cycle time, hopper dimensions, observed compaction ratios, and whether or not the compaction mechanism is operative while the vehicle is in motion. Safety considerations and statistics should continue to be categorized by vehicle and included in vehicle analysis. The fleet maintenance facilities must be studied to determine the most effective distribution in conjunction with the area-based organization.

The Department of Sanitary Engineering should continually study the effectiveness of its equipment and compare it to other types available on the market, thus enabling the District to recognize and take advantage of improvements in equipment and methodology.

Improvements are needed in the maintenance program. Some will result from the decentralization of the organization. Minor maintenance (including washing) facilities should be situated within each sanitation district, relieving the congestion at the major repair facility. Record keeping and policies for procurement of parts and supplies need immediate attention. Training programs are being established for maintenance personnel, operators and supervisors.

IV. SCHEDULE OF PLAN IMPLEMENTATION

During the course of this study there has been close liaison with the operating organization, and the experience of that group has resulted in many of these recommendations. Consequently, much of the work proposed in this report has already begun. Preliminary studies and implementing procedures for the establishment of the area control concept were to be completed by January 1970 for the pilot study area in Anacostia. A program of orderly development of effective management and administration on a city-wide basis will be scheduled on a basis of the feedback of information from the pilot study area.

Reorganization and development of management controls for the improvement of manpower utilization and productivity are needed. Continued effort will be required to maintain and operate these controls.

The development of a refuse collection management system was begun in August 1969, and is expected to be completed by the end of calendar year 1971. It will include the establishment of revised collection routes for the area-based system of control along with the establishment of an organization within the Bureau of Sanitation Services to maintain the system.

A study of methods of recruiting, training and promoting of personnel is being conducted concurrently by the department personnel office and should be completed as required parallel to the establishment of management controls.

The development of an improved system for District of Columbia equipment selection, maintenance and repair is to be included in a department-wide program to be conducted during the next year and scheduled for completion by the end of 1971. Standards for commercial haulers as discussed in Chapter 1 of this report should closely parallel the developments of the District's improved system. Federal haulers, private citizens, demolition and excavation contractors and others collecting and transporting should also be covered by these regulations.

A study should be made of the effects on refuse collection practices of the various types of on-site containers. This study will require approximately one man-year of engineering and technician time to be followed by a three month test period to give sufficient data across a range of weather conditions. This study should include the development of a firm, consistent policy for location of pickup points.

V. BENEFITS

The overall benefits to the collection system resulting from the proposals listed in this chapter will be returned to the citizen as productivity and service improvements. These benefits include the following: twice per week collection, more thorough street cleaning, combined collection of garbage and trash, closer supervision resulting in neater work and fewer missed collections, cleaner and more dependable vehicles, upgrading of practices of private and contracted collectors, health and aesthetic benefits in the use of one-way containers, increased efficiency in the cleaning of vacant lots and in the assisting of public cleanup campaigns, and a general improvement in the responsiveness of the department to public demands.

The results which will benefit the department and its employees include improvement in the training offered, increased promotion possibilities, adoption of a more effective safety program, establishment of more efficient repair and maintenance procedures, time and effort savings accompanying the use of one-way containers, and the acquisition of improved equipment.

Implementation of management controls in the collection of solid waste by the bureau should increase productivity and result in considerable savings leading to higher standards in city street cleaning and refuse collection.

The cost of vehicle repairs is another area in which marked savings are envisioned. Acquisition of improved garage facilities will result in a considerable reduction in the cost of repairs to these facilities, which at $521,000, is currently higher than the cost of vehicle repair.

CHAPTER FIVE. DISPOSAL

1. PRESENT DISPOSAL FACILITIES

A. INCINERATORS

The District of Columbia, Bureau of Sanitation Services, operates four incinerator plants having a combined design capacity of 1,595 tons of refuse per 24-hour day. All plants are batch-fed with rectangular furnaces having either fixed or rocking grates. The two older plants have no provisions for air pollution control. The newer plants were designed with large subsidence chambers in which some of the larger and more dense particulates settle before the flue gases enter the stacks.

Changes in the residential area adjacent to these plants and the air pollution caused by stack emissions of the plants have required a reduction in their aggregate operating capacity to approximately 1120 tons of refuse per 24-hour day. This 25 percent reduction in operating capability has reduced the air polluting emissions from the plants but has also placed a greater burden on the waste disposal operations at the sanitary landfills.

1. Georgetown Incinerator

The Georgetown Incinerator is the smallest of the four existing incinerator plants. This plant was constructed in 1932 on South Street near 31st Street in the northwest section of the city. The plant contains two furnaces, each rated at a capacity of 85 tons per 24-hour day, providing a total plant capacity of 170 tons of refuse per 24-hour day.

This plant is 37 years old with furnaces that require considerable hand labor. Since it operates at 50 percent of its design capacity and reduces the weight by only 30 percent, at a cost of $12.00 per ton of raw refuse, retirement of this plant is contemplated as soon as alternate capacity is available.

2. 'O' Street Incinerator

The 'O' Street Incinerator was also constructed in 1932 and is located at the intersection of 'O' Street and Canal Street, S.E. The plant contains five furnaces, each rated at a capacity of 85 tons per 24-hour day providing a total plant capacity of 425 tons per 24-hour day.

Preceding page blank

This plant operated in FY 1969 at a rate of 250 tons of refuse per 24-hour day, a reduction of almost 40 percent from its design capacity. Operating costs averaged $9.42 per ton of raw refuse. One furnace in this plant is made available for the destruction of confidential material during the day shift. The special loading and burning procedures associated with this operation greatly reduce the effective capacity of this furnace. Raw refuse weight reduction in fiscal year 1969 averaged 40 percent. Retirement of this plant is contemplated when new disposal facilities become available.

3. Mount Olivet Incinerator

The Mount Olivet Incinerator, constructed in 1955 and located near West Virginia Avenue and Mount Olivet Road, N.E., contains four furnaces each rated to burn 125 tons per 24-hour day, or 500 tons total capacity per 24-hour day. The plant operates on a six-day week and 24-hour per day basis. In FY 1969 it averaged 360 tons per day, at an operating cost of $7.18 per ton of raw refuse and a weight reduction of 42 percent.

4. Fort Totten Incinerator

The design and rated capacity of the Fort Totten Incinerator, built in 1961 near Fort Totten Drive and Hawaii Avenue, N.E. are the same as for the Mount Olivet Incinerator. In FY 1969 it averaged 410 tons per day, at an operating cost of $7.45 per ton of raw refuse and a weight reduction of 41 percent.

B. LANDFILLS

In FY 1969 a total of 531,200 tons of refuse were placed in landfills by the District (including incinerator residue). Below is the breakdown to the various landfills. The Oxon Cove Landfill replaced the Kenilworth landfill in October 1969 and, therefore, is not included in the listing which follows:

Disposal Sites	Total Refuse (Including Incinerator Residue) tons
Kenilworth Landfill	458,300
51st and Fitch Street Landfill	30,900
Dyke Marsh Landfill	32,300*
Cherry Hill Landfill	9,700
Total	531,200

* Incinerator residue not accepted.

TABLE 16

INCINERATION COSTS FOR EXISTING PLANTS - FISCAL YEAR 1969

	Incinerator Plant				
	Fort Totten	Mount Olivet	O Street	Georgetown	Total
Rated capacity - tons/day	500	500	425	175	1,595
Annual refuse handled	127,800	113,600	64,800	23,000	329,200
Annual Cost					
Personnel	$552,900	$599,400	$479,200	$191,700	$1,823,200
Utilities	15,400	10,000	4,700	3,400	33,500
Maintenance (Incinerators)	104,700	57,200	30,800	24,500	217,200
Maintenance (Automotive equipment, e.g., ash trucks)	82,500	43,800	23,600	18,500	168,400
Miscellaneous	195,800	105,300	72,000	38,000	411,100
Total Cost (Annual)	$951,300	$815,700	$610,300	$276,100	$2,653,400
Per ton	$7.44	$7.18	$9.42	$12.00	$8.06

In FY 1969, 205,900 tons of incinerator residue were deposited at the landfills. This amount represents almost 40 percent of the total annual amount received at the landfills. Its high density is a factor reducing the cost per ton in landfill operations, which was $1.89 in FY 1969 — including personnel, equipment and transfer facilities, but excluding real estate values.

1. Dyke Marsh Landfill

The Dyke Marsh Landfill is located south of Alexandria, Virginia, with access from the George Washington Memorial Parkway and has been in operation since June 1966. It is owned by the National Park Service. The landfill is being filled with demolition material, utilizing excavated material from federal government installations as daily cover. Dredging operations are being carried on offshore for sand and gravel companies in the area. The National Park Service estimates that dredging operations to 1981 will create approximately 5,000 acre-feet of fill space. However, only 700 acre-feet of this will be used for the landfill. The current life expectancy of this site is approximately 3.5 years based on the average daily fill rate of 120 cubic yards generated in FY 1969.

The future use of this site will be as a refuge for migratory waterfowl and aquatic life. It is being constructed at mean tide elevation to provide an environment conducive to aquatic growth.

2. Cherry Hill Landfill

The Cherry Hill Landfill is located in Prince William County, Virginia. It may be reached by road from U.S. 1, by rail on the Richmond-Fredericksburg and Potomac Railroad System, or by water from the Potomac River. The area of the landfill is approximately 25 acres.

In FY 1969, 9,700 tons of solid waste were shipped to Cherry Hill by rail. Available fill space is calculated at 250 acre-feet or 400,000 cubic yards. The density of material in place is presently estimated to be ½ ton per cubic yard. The life expectancy of the landfill is 5,000 days, based on the current daily fill rate of approximately 80 cubic yards.

Refuse consisting of contaminated foodstuffs, incinerator residue, street sweepings, sewage screenings and grit, is shipped by rail to the Cherry Hill Landfill two to three times weekly.

3. Kenilworth Landfill

For many years an open burning dump was operated at Kenilworth. While the Department of Sanitary Engineering desired to eliminate this dump as part of its disposal program inadequate funds and extreme shortage of available land were obstacles.

During the Conference on Solid Waste Management for the Metropolitan Washington Area in July 1967, the Public Health Service made a public announcement that they would provide grant-in-aid assistance in the conversion of this dump to a model sanitary landfill. Following this offer negotiations with the National Park Service concerning final elevations and a park development plan were completed, and the sanitary landfill was begun in February 1968.

Operation of the sanitary landfill continued for 20 months; it was closed for general trash in October 1969. The receipt of incinerator residue from District incinerators was continued beyond this closing, however, to bring this section to final grade. Final landscaping will begin in the spring of 1970.

In FY 1969, 458,300 tons of solid waste were landfilled at a daily fill rate of 1,470 tons. Exclusive of incinerator residue, 900 tons of general refuse were handled.

4. 51st and Fitch Street Landfill

This 6.5 acre landfill, located in the District, was opened in January 1969. In FY 1969, 31,000 tons of solid waste were deposited at the landfill with 22,000 tons of incinerator residue being the major constituent. The other 9,000 tons consisted of street sweepings, sewage screenings and grit. This landfill has an expected life of approximately 18 months.

5. Oxon Cove Landfill

The Oxon Cove Sanitary Landfill was opened in October 1969. This landfill site is owned by the National Park Service which has agreed to allow the District to use the site as a sanitary landfill. The site will be developed as a public golf course.

That portion of the site within the District of Columbia consists of 40 acres. It is expected that this area will have been filled to agreed upon elevations by February 1970. At that time, the operation of the landfill will be continued in the 110 acres of the site in Maryland. The life expectancy of this portion is approximately two and one-half years at the present fill rate of 1,100 tons per day, six days per week, without accepting residue from D.C. incinerators.

C. LEAF DISPOSAL

Leaf disposal sites are located on municipal and park lands in cooperation with the National Park Service. In FY 1969, 5,500 tons of leaves were deposited at these sites.

D. TRANSFER STATION GRINDER

The District of Columbia has a central garbage grinding station at its transfer station located at New Jersey Avenue and K Street, S.E. At this site, garbage is ground and discharged to the sewers for disposal in the D C. Water Pollution Control Plant. In FY 1969, 4,400 tons of refuse were discharged to the sewers through this facility.

II. FUTURE DISPOSAL REQUIREMENTS

A. REFUSE QUANTITIES

In order to determine facilities and space requirements for disposal of refuse, future quantities of various types of refuse generated and the final disposal space required per unit of quantity have been estimated. Due to indeterminable factors which may affect future refuse characteristics and quantities, the heterogeneity of wastes, and the variation of volumetric reduction achieved by different disposal methods, forecasts of disposal needs are approximate.

1. Population

In 1968 the Metropolitan Washington Council of Governments obtained the results of a population study by Hammer, Greene, Siler Associates that is used to estimate future solid waste disposal needs. The median of the project high and low values of this study follow.

Actual	Projected				
1968	1969	1970	1980	1990	2000
809,000	811,400	814,700	851,900	932,300	1,041,700

2. Classification of Refuse

a. Incinerables

Incinerable refuse is that refuse which may be effectively reduced in volume and weight by burning at ordinary municipal incinerator temperature ranges. This includes most wastes routinely collected from residences and institutions and a substantial part of commercial and industrial refuse. Incinerable refuse collected in the District of Columbia is largely paper, cardboard, bottles, tin cans, plastics, yard and garden rubbish, wood chips and small furniture. Dry leaves and garbage are incinerable when mixed with other incinerable materials, but large quantities of garbage and wet leaves are difficult to burn in the D.C. incinerator plants and for this reason are generally handled by the Bureau of Sanitation Services as non-incinerables.

b. Non-incinerables

Non-incinerable refuse includes those wastes which are not reduced in volume by burning, are hazardous, are injurious to an incinerator, or which, without preprocessing, are too large to be handled in the present or planned incinerator or will not be reduced in the normal incinerator burning cycle. Such wastes are usually disposed of by landfill, either with or without burning to reduce the volume of combustible components. Major items of non-incinerable refuse fall into several categories.

(1) Bulky Combustibles

These are materials which could be reduced in volume by burning but are too bulky for present D.C. incinerators, e.g., logs, stumps, brush, large crates, large lumber, large furniture.

(2) Bulky Non-combustibles

These are materials which cannot be reduced in volume by burning and are too bulky to be suitable for solid fill, such as refrigerators, stoves, bedsprings, and bicycles. Much of this material has potential salvage value and is delivered to a salvage company.

(3) Solid Fill Materials

These are materials resulting from demolition and excavation such as earth, sand, gravel, brick, concrete, masonry and plaster. These materials are suitable for constructing stable landfills.

(4) Abandoned Vehicles

Abandoned passenger automobiles, trucks, trailers, and large parts of these that are no longer useful for their original purpose and have been left unattended, constitute a growing volume of non-incinerable solid waste for disposal. In some cases these vehicles are processed for their metal value but this is a marginal economic operation.

3. Quantity of Incinerable Refuse

The approximate quantity of incinerable refuse for municipal disposal in the District of Columbia for FY 1969 is reported in Table 17. These figures are from Bureau of Sanitation Services records, supplemented by population data from special surveys.

Historical data present a mixed picture regarding the trend in per capita quantities of incinerable refuse in the District of Columbia. Available data do not support detailed assumptions of trends in per capita quantities. However, the following factors could significantly increase the per capita rate of 3.91 pounds per day in the future.

1. The retirement of a large number of the older private incinerators in apartment buildings and commercial sites is expected to amount to 187,000 tons per year when the new Air Pollution Control Regulation takes effect in 1972.

2. Technological developments in packaging and in the increased use of disposal substitutes for reusable items will tend to increase the per capita refuse.

3. Improvements in the standard of living especially in what are now impoverished areas should also increase the amount of refuse generated.

TABLE 17

QUANTITY OF INCINERABLE REFUSE FY 1969

Incinerated	Tons
District of Columbia facilities	329,100
Landfilled	
District of Columbia (and ash from on-site incinerators)	249,600
Total incinerable refuse	578,700
Pounds per capita, per year	1,426*
Pounds per capita, per calendar day	3.91*

* based upon a population of 811,400.

Projections of estimated capacity requirements are predicated on per capita generation rate increases of two percent per annum over 1969 production. This factor, which is conservative, allows for the increase mentioned above; it was suggested for the area by Black and Veatch, Consulting Engineers, in their Solid Waste Disposal Study: Washington Metropolitan Region, 1967. Annual quantities of incinerable refuse are projected in Table 18 on the following basis:

1. A 1969 average of 3.91 pounds per capita per day within the city increasing at a rate of 2.0 percent per annum to FY 1971.

2. In 1972, an average of 5.47 pounds per capita per day increasing at a rate of 2.0 percent per annum to FY 2000. This will include the on-site refuse increase expected due to phasing out of incinerators in apartment buildings and commercial sites.

TABLE 18

ESTIMATED POPULATION AND FUTURE QUANTITIES OF INCINERABLE REFUSE

	Population	Pounds/capita/day	Tons annually
Actual 1969	811,400	3.91	578,700
Projected 1970	814,700	3.99	593,300
Projected 1980	855,000	6.35	992,200
Projected 1990	932,300	7.44	1,270,500
Projected 2000	1,041,700	8.53	1,630,500

The quantity of refuse produced in the District varies seasonally. The magnitude of variation is important in the design of disposal facilities since sufficient capacity must be provided to dispose of the maximum quantity received in a limited time interval. Analysis of District records as well as generally accepted experience indicates that peak monthly quantities of incinerable refuse approaches 114 percent of the average 6-day weekly quantity.

Incineration does not provide complete disposal for refuse but is rather a method of reducing the volume and weight for final disposal. Incinerator plant records show that a ton of normal incinerable refuse results in 1.0 cubic yard or 0.60 tons of quenched (wet) residue.

Studies conducted by the Department of the Interior, Bureau of Mines, at the University of Maryland, show densities and moisture contents of residue from incinerator plants in the District as follows:

	Approximate Range
Wet bulk density lbs/yd.^{3}	820-1050
Dry bulk density lbs/yd.^{3}	520-635
Moisture, percent of wet weight	25-40

4. Quantity of Non-incinerable Refuse

Non-incinerable refuse produced by the District is even more heterogeneous than the normal incinerable refuse. The rate of production is also

more variable due to the seasonal or irregular schedules of city activities which produce significant quantities of various types.

Non-incinerable refuse is usually recorded by estimated volumes without regard to composition or unit weight. A significant amount of non-incinerable refuse produced in the District is not brought to District operated disposal facilities but is disposed at privately owned sites; hence, basic quantitative data for non-incinerable refuse are meager.

Future quantities of non-incinerable refuse exclusive of solid fill materials, abandoned automobiles, and incinerator residue are projected on the following basis:

1. Per capita quantities will increase at the annual rate of two percent of 1969 quantities.

2. Population as projected in Table 17.

Table 19 shows projected per capita and annual quantities of non-incinerable refuse for the District of Columbia.

TABLE 19

ESTIMATED FUTURE QUANTITIES OF NON-INCINERABLE REFUSE

	Pounds/capita/day	Tons annually
Actual 1969	0.35	51,700
Projected 1970	0.36	53,500
Projected 1980	0.43	67,300
Projected 1990	0.50	85,600
Projected 2000	0.57	109,000

a. Solid Fill Material

(1) Demolition

A special study in 1968 showed that debris and rubble generated by demolition amounted to approximately 520,000 cubic yards. This estimate originated from an analysis and compilation made by the District of Columbia Demolition Contractors Association.

Demolition contractors generally subcontract for rolling stock to transport the material to disposal. A representative of the D.C. Contract Hauler's Association estimates that members will haul 600,000 cubic yards annually from sites within the District, and places this estimate as 90 percent of the city's total. On this basis approximately 700,000 cubic yards of demolition material are expected to be generated annually in the District.

(2) Excavation

Quantity records for most excavation material generated in the District are not available. The D.C. Contract Haulers Association estimates that 1.6 million cubic yards of building construction excavation are produced annually in the District.

With the advent of increased highway and building construction and the construction of the subway system, the projected annual rate of generation of excess excavation material in the District is 2.5 million cubic yards for the duration of those activities. This estimate was obtained through consultation with representatives of the major excavation and hauling firms operating in the District.

b. Abandoned Automobiles

Since July 1963 the District has disposed of approximately 42,000 abandoned vehicles through auction sales and local scrap dealers. This represents an annual average of 6,000 vehicles.

The present annual rate of increase in the number of abandoned automobiles is approximately 6 percent. Using this figure the projected annual number of abandoned vehicles that will be received for disposal are shown below:

1970	1975	1980	1985
6,740	8,760	11,390	14,810

B. DISPOSAL CAPACITY REQUIREMENTS

Projected annual refuse quantities exclusive of solid fill materials and abandoned automobiles for the District are shown in Table 20, which follows on the next page.

TABLE 20

PROJECTED ANNUAL REFUSE QUANTITIES FOR THE DISTRICT OF COLUMBIA

Year	Incinerables	Non-incinerables			Total Refuse	Incinerables & Bulky Comb.
		Combustibles	Non-Comb.	Total		
	tons	tons	tons	tons	tons	tons
1969	578,700	12,900	38,800	51,700	630,400	591,600
1970	593,300	13,400	40,100	53,500	646,800	606,700
1980	992,200	16,800	50,500	67,300	1,059,500	1,009,000
1990	1,270,500	21,400	64,200	85,600	1,356,100	1,291,900
2000	1,630,500	27,300	81,700	109,000	1,739,500	1,657,800

1. Incineration

Bureau of Sanitation Services records show the following quantities of refuse incinerated in the existing District of Columbia incinerator plants for the past five fiscal years:

Year	Annual Refuse Incinerated (tons)
1965	366,590
1966	345,372
1967	312,628
1968	354,817
1969	329,115

The average amount of raw refuse incinerated over this period was 342,000 tons. Since the design capacities of the plants were constant during the period, the variations in the amounts handled reflect operating conditions: combustion quality of material received, time required for plant repairs, skill of operators and other factors.

The incineration capacity required, shown in Table 21, are based upon the following assumptions.

a. The District of Columbia will need to place maximum reliance on incineration since citizens of other states may object to the transport of solid waste to or through their jurisdictions to sanitary landfills.

b. Maximum daily refuse quantities will equal approximately 114 percent of average daily quantities for a 6-day week.

c. Firm capacity will be available to burn in continuous 6-day operation all refuse received during the maximum week.

d. Procedures will be modified to eliminate the special handling of classified materials.

e. Incinerator residue and other non-incinerables will be shipped by rail or barge to distant landfills.

TABLE 21

ESTIMATED INCINERATION CAPACITY REQUIRED FOR THE DISTRICT OF COLUMBIA
(Assuming maximum emphasis on incineration)

Year	Average daily quantity of incinerable refuse (based on 6-day week)	Required incineration capacity (Based on peak monthly 6-da.wk.) 114% of avg. daily quan.
	tons/day	tons/day
1970	2060	2350
1975	3020	3440
1980	3480	3970
1985	3820	4350
1990	4320	4920
1995	4900	5590
2000	5530	6300

2. Land Requirements

The land area required for final disposal of refuse from the District will depend upon a number of factors, including:

a. The quantity of various types of refuse produced.

b. The amount of preprocessing by incineration, salvaging, shredding, baling, or other methods prior to final disposal by landfill.

c. The depth to which disposal sites are filled.

a. Unit Landfill Space Requirements by Refuse Type

(1) Incinerable Refuse

Space requirements for sanitary landfilling of incinerable refuse are premised on incinerable refuse occupying two cubic yards of landfill space per ton.

(2) Bulky Non-incinerable

Bulky non-incinerables are also estimated to occupy two cubic yards of landfill space per ton.

(3) Preprocessed Bulky Non-incinerable Refuse

Preprocessed bulky non-incinerables, considering combustibles and non-combustibles together, are assumed to require one cubic yard of landfill space per ton of unprocessed material.

(4) Incinerator Residue

Landfill requirements for incinerator residue are premised on a ton of raw incinerable refuse being reduced by incineration and subsequent compaction to occupy a volume of 0.4 cubic yard in a landfill.

b. Projected Landfill Space Requirements

Cumulative landfill space requirements for all refuse except demolition and excavation materials, starting in 1970, are shown in Table 22. Space requirements are indicated for two conditions. The maximum would be required if all waste was landfilled without preprocessing. The minimum space requirements assume maximum preprocessing by shredding and incineration.

TABLE 22

PROJECTED LANDFILL SPACE REQUIREMENTS FOR THE DISTRICT OF COLUMBIA

Year	Cumulative quantities of raw refuse (tons)			Cumulative landfill space req. (acre feet)	
	Incinerables	Non-incinerables	total	Raw refuse[1]	Residue[2]
1970	593,300	53,500	646,800	809	248
1975	4,606,600	342,800	4,949,400	6,187	1,900
1980	9,337,800	665,700	10,003,500	12,504	3,840
1985	14,684,300	1,026,800	15,711,100	19,639	6,031
1990	20,738,300	1,434,100	22,172,400	27,716	8,511
1995	27,600,400	1,892,800	29,493,200	36,867	11,322
2000	35,364,500	2,411,500	37,776,000	47,220	14,501

[1]Maximum space requirements based on all refuse being sanitary landfilled without preprocessing.

[2]Minimum space requirements based on refuse being reduced in volume by shredding of bulky combustibles and incineration of normal incinerables and shredded bulky combustibles prior to final disposal by landfill.

III. ALTERNATIVE DISPOSAL METHODS

A. INCINERATION AT CENTRAL PLANTS

Refuse incineration, the volumetric reduction of combustible wastes by high temperature burning, is not a complete disposal method. A non-combustible residue remains for disposal by other methods.

The advantages of incineration include a smaller land requirement, a central location with a short refuse haul, and a relatively inert and nuisance-free end product suitable for reclaiming marginal land or constructing stable landfills.

Disadvantages of incineration include relatively high investment and operating costs, high labor requirements, incomplete disposal and the need for complex equipment to overcome air pollution and nuisance.

B. INCINERATION OF BULKY COMBUSTIBLE WASTES

Stumps, logs, brush, large lumber and other bulky combustible wastes too large or too slow burning for conventional municipal incinerator plants can satisfactorily be incinerated in furnaces specially designed to accommodate such material. Incineration offers certain advantages over landfilling, the prevalent disposal method for bulky combustible waste in the District. Advantages include:

1. Incineration residue requires only a small fraction of the landfill space required for the unburned materials.

2. For remote landfills, the hauling costs for unburned material is substantially greater than those for the residue of the same material.

To date, few incinerators have been build to process bulky wastes. Additional research and developmental work is needed to produce incineration equipment to handle satisfactorily the wide range of bulky combustible waste.

C. SHREDDING OF BULKY WASTES

With equipment now on the market, virtually all forms of bulky refuse can be shredded or crushed into sizes which greatly facilitate both salvage and disposal. After shredding, bulky combustibles can be burned along with normal household refuse. Non-combustibles can be further processed by methods such as baling or disposal directly into landfills, with considerable savings in space requirements.

D. SANITARY LANDFILL

Sanitary landfilling, the compaction of refuse to a minimum practical volume and covering it with earth or other inert materials, is the only acceptable landfill method for solid wastes containing decomposable materials.

The operation of the model sanitary landfill at Kenilworth has shown that properly located and operated sanitary landfills can provide satisfactory, economical, and nuisance-free disposal for virtually all types of refuse, even within a densely populated metropolitan area. Sanitary landfills have advantages over other acceptable disposal methods. They are economical, usually require relatively little capital investment, may reclaim land for certain uses, do not cause air pollution and require a minimum of skilled labor for satisfactory operation.

However, sanitary landfills require much more land area than most other disposal methods and future sites may be hard to acquire. Sites

distant from areas of refuse production, as future District sites will be, may require high haul costs. Conventional transportation by truck and highway may be inadequate requiring the development of rail and barge transport to marginal land needing reclamation.

E. FEEDING GARBAGE TO HOGS

Until June 1969, the District of Columbia supplied garbage to farmers for feeding to hogs. Due to the decreasing quantity of garbage in household refuse, the use of household refuse grinders, and the inherent health hazards to both men and hogs, feeding of garbage to hogs has dwindled to insignificance as a refuse disposal method in most parts of the U.S. The outbreak of hog cholera in May 1969, caused the Bureau of Sanitation Services to stop supplying garbage to farmers. However, some farmers still collect garbage directly from District hotels, restaurants and other similar establishments. The planned conversion to combined garbage and refuse collections by the District will eliminate the resumption of the supply of garbage to farmers by the District.

F. GRINDING AND DISCHARGING TO SANITARY SEWERS

A substantial part of the garbage produced in the District is ground and discharged to sanitary sewers at residences and commercial establishments. Its convenience and economy suggest that the use of this method will increase in the future. However, it presently provides disposal for only a small percentage of refuse. A major advantage of this practice is elimination of putrescible material and moisture from the remaining refuse, making it easier to store and handle. Grinding of garbage and its disposal via sewers, it must be noted, is an interim disposal method as it transfers the problem to one of wastewater treatment.

G. ON-SITE INCINERATION

On-site incineration in apartment buildings and commercial and industrial establishments reduces the quantity of refuse delivered for disposal at the District disposal facilities by a substantial percentage.

On-site incineration will continue in the future but may be reduced significantly when the Air Pollution Control Regulation places strict control on the type of private incinerators which may be used. It is anticipated that the enforcement of this regulation will increase the amount for which the District must provide disposal facilities by nearly 500 tons per day.

H. BALING

Although not a disposal method, baling is being considered as a possible means for reducing the volume and improving the handling characteristics of domestic and commercial wastes, thus minimizing hauling costs

and landfill space requirements. A transfer and baling station is in the final design stage with barging to downriver sanitary landfills assumed. A local railroad is also considering this volume reduction method in connection with their proposal for a disposal program based upon rail-haul. Preliminary design of this transfer station assumes that it will handle 1,000 tons per day plus incinerator ash and other non-incinerables.

I. SALVAGE

Salvaging, or the reclamation of material of value from solid waste prior to disposal, is applied in the District only to large metal appliances such as stoves and refrigerators which are given to a scrap metal dealer. Abandoned automobiles are salvaged through auction and by local scrap dealers. In spite of high and relatively stable generations of reusable paper wastes in the area, there is only a small unstable market for it. No private salvage is allowed or carried on at the central disposal facilities in the District because of safety considerations and possible interference with the landfill operation. In recent years, there has been decreasing market for tin cans and virtually no market for the low grade iron and steel scrap found in District refuse.

In general, the only salvage operations warranting consideration are those which: (1) do not interfere with the primary objective of disposal, (2) are largely mechanized and require little labor, and (3) recover items which remain relatively stable in value and for which markets are reasonable assured.

Because of high labor requirements and instability of markets for most salvage items, intensive salvage from refuse has proved unfeasible whether privately or District operated. The situation is not expected to change significantly in the foreseeable future.

J. COMPOSTING OF LEAVES

The District of Columbia composts leaves for use as a soil conditioner; the process is carried out on municipally owned lots, on park lands where it does not interfere with park usage, and on private lots volunteered by owners. Composting is a low cost, inoffensive, practical method of leaf disposal resulting in considerable reduction in the seasonal load on refuse-hauling and incineration facilities.

As a refuse disposal method, composting has the advantage of producing a useful end product, with small land requirement in a relatively nuisance-free manner. Potential disadvantages include wind scattering and the lack of a market for the end product.

IV. DISPOSAL PLAN

The recommended disposal plan for the District of Columbia is shown graphically on Chart 3. Alternative No. 1 is shown on Chart 4, and alternative No. 2 is shown on Chart 5.

A. RECOMMENDED PLAN

The recommended plan of this report is an endorsement of the Department of Sanitary Engineering's plan which the latter is attempting to implement. It provides maximum flexibility and reliability by a three-prong approach:

1. Construction of a 1500 tons per day incinerator (No. 5) with sophisticated air pollution control equipment which will assure that rigid air quality standards are met. The residue from this incinerator will be shipped to a distant sanitary landfill by barge or rail.

2. Construction of a 1000 tons per day transfer and baling station on the shores of the Anacostia River. The bales of refuse will be hauled to a downstream sanitary landfill. The District owns a downstream site for a sanitary landfill that it proposes to use. Objections developed, however, and at the time this report was prepared negotiations were proceeding for the use of an alternate site.

3. The third element of the plan anticipates rail-haul to a distant sanitary landfill. At the time the report was nearing completion, there were two possibilities:

(a) The Metropolitan Washington Council of Governments was attempting to develop a regional program. The details of the plan were not fully developed but is was understood that planning was based upon the construction and operation of transfer facilities in the cooperating jurisdictions either by the jurisdiction itself or by COG. The refuse, which would be either baled on containerized, would be hauled by rail to a sanitary landfill site in Virginia which the Council of Governments would operate. It was understood that the Council of Government's plan for the operation of the sanitary landfill had been approved by Virginia state and local officials. The District agreed to cooperate with a regional program to the extent of 1000 tons per day, provided a reliable system which was economically competitive with other solutions available to the District could be assured by April 1970.

(b) The Southern Railroad reported that they had developed a system on which they were ready to make a proposal to the District. This private enterprise project proposes a complete system and includes the construction and operation of the transfer station, rail-haul and operation of the sanitary landfill. All elements were reported to have been approved by necessary authorities and could be implemented within 18 months after a contract was signed.

One of the obstacles to the implementation of this third element of the program was the lack of authority by District officials to sign long term contracts for this purpose. At the time this report was prepared, the District was seeking this authority from Congress in order that it might meet its responsibilities.

B. ALTERNATIVE NO. 1 TO RECOMMENDED PLAN

Alternate No. 1 to the recommended plan is composed of the same elements as the recommended plan. The only difference is that it is anticipated that the railhaul contract or participation in a regional program would be for a relatively constant amount in the early years with an expansion of the transfer and baling station to 1500 tons per day in 1980.

C. ALTERNATIVE NO. 2 TO RECOMMENDED PLAN

Alternate No. 2 differs considerably from the recommended plan and first alternate in that much more reliance is placed upon incineration. This alternate would be necessary in the event the Congress denied District officials the authority for long term rail-haul contracts. In this eventuality, Incinerator No. 5 will be constructed as planned. The initial capacity of the baling and barging facility, however, would be increased to 1500 tons per day and the reconstruction of Mt. Olivet and Ft. Totten incinerators would be scheduled.

Since the existing incinerators must be used until the time Incinerator No. 5 and the baling and barging facility are in operation, Mt. Olivet and Ft. Totten cannot be removed from operation for reconstruction immediately. Alternate No. 2 contemplates that Ft. Totten incinerator will continue to operate during the period Mt. Olivet is being reconstructed, at which time it will be removed from operation and reconstructed itself.

While detailed engineering studies have not been accomplished, it is generally believed that the existing sites for the Ft. Totten and Mt. Olivet incinerators will be adequateonly for a 500 tons per day installation in view of the considerable space required for air quality control equipment. Assuming that the projections of incinerables and non-incinerables are accurate an additional incinerator must be placed in operation by 1985. An effort should begin at once to find a suitable site, preferably in the northwest quadrant of the city since that would reduce the haul distance to a disposal facility. Incinerator No. 5, Mt. Olivet and Ft. Totten are all three in the northeast quadrant of the District.

Chart No. 3

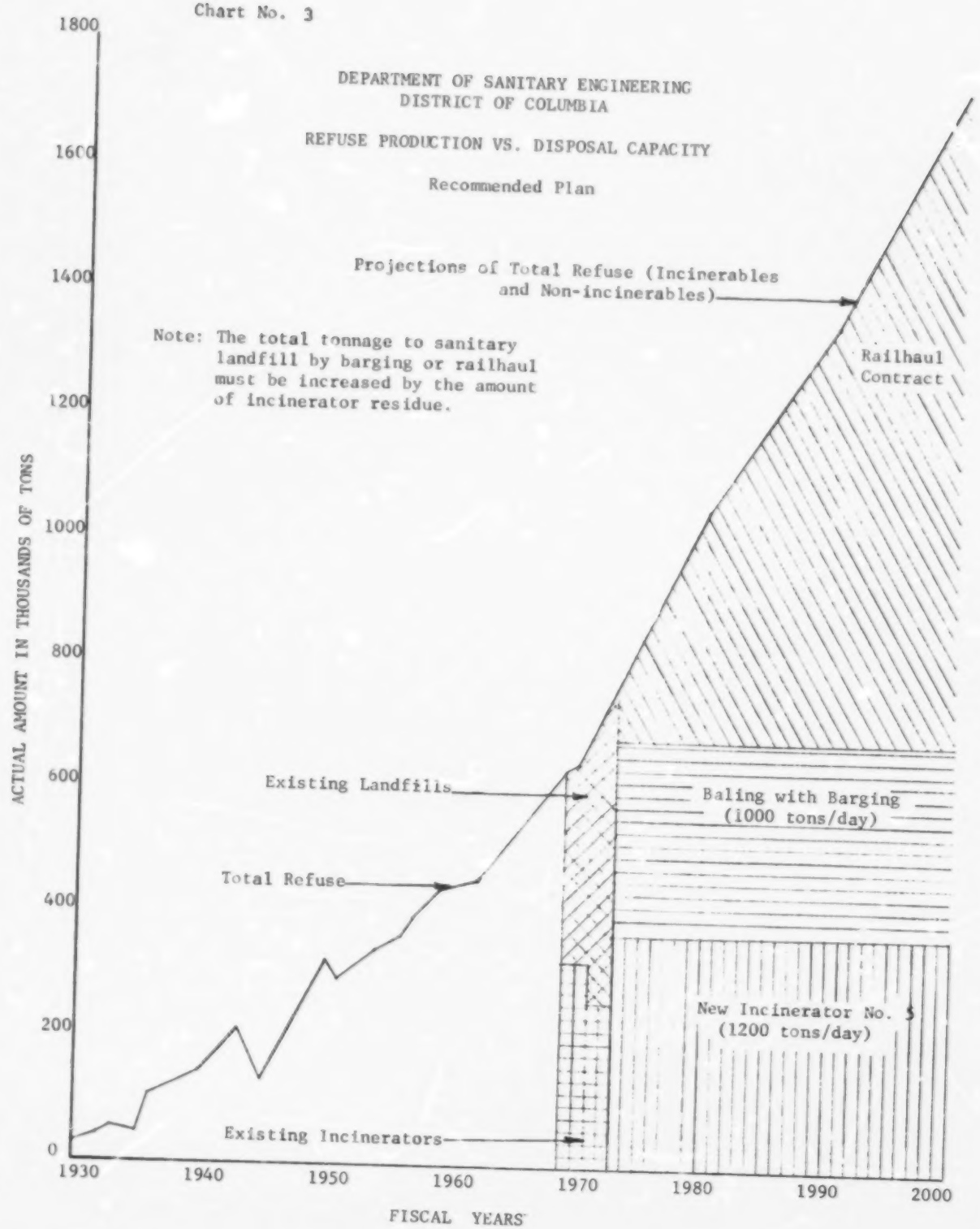

DEPARTMENT OF SANITARY ENGINEERING
DISTRICT OF COLUMBIA
REFUSE PRODUCTION VS. DISPOSAL CAPACITY
Recommended Plan
Projections of Total Refuse (Incinerables and Non-incinerables)
Note: The total tonnage to sanitary landfill by barging or railhaul must be increased by the amount of incinerator residue.
Railhaul Contract
Existing Landfills
Baling with Barging (1000 tons/day)
Total Refuse
New Incinerator No. 5 (1200 tons/day)
Existing Incinerators
ACTUAL AMOUNT IN THOUSANDS OF TONS
1800
1600
1400
1200
1000
800
600
400
200
0
1930
1940
1950
1960
1970
1980
1990
2000
FISCAL YEARS

Chart No. 4

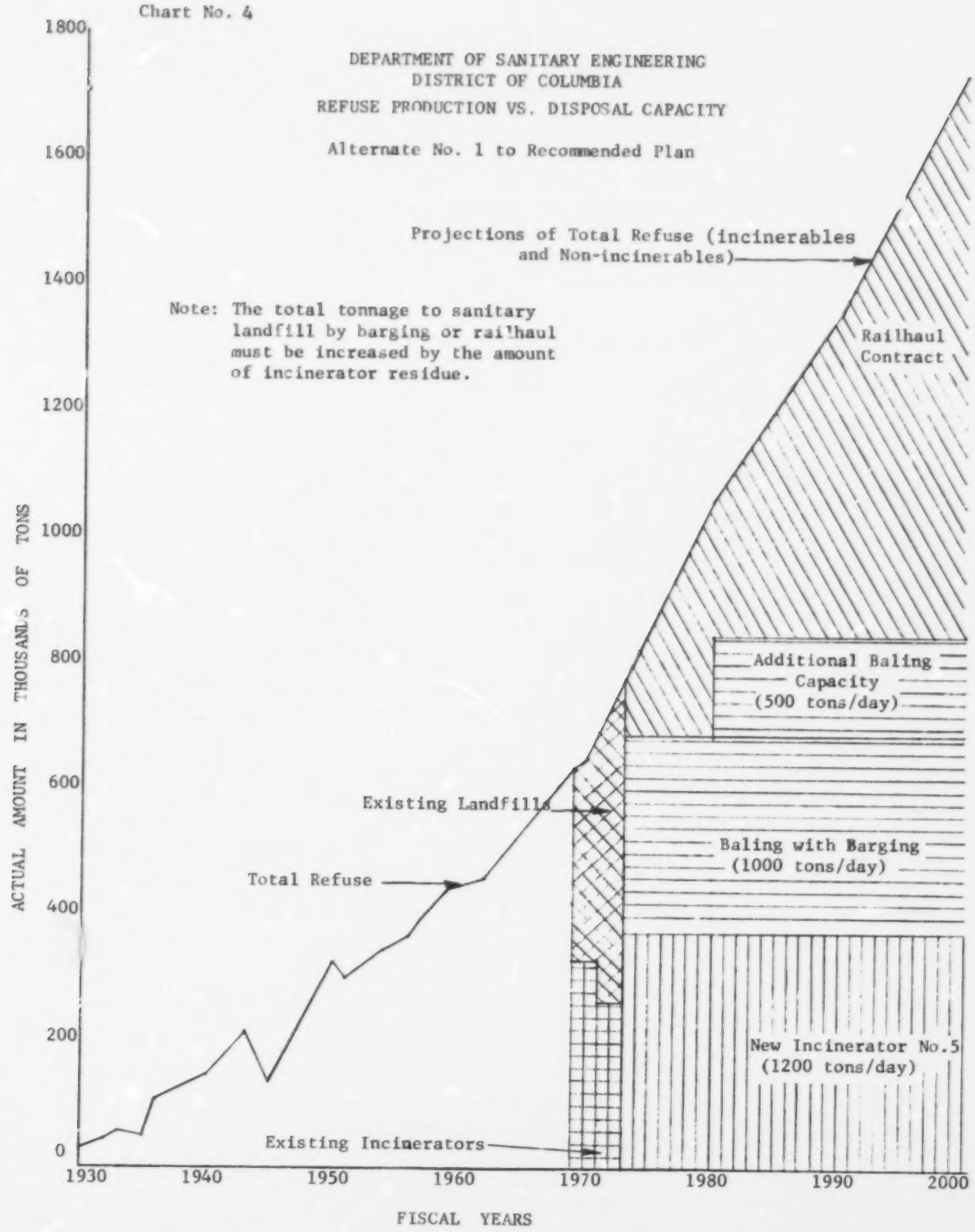
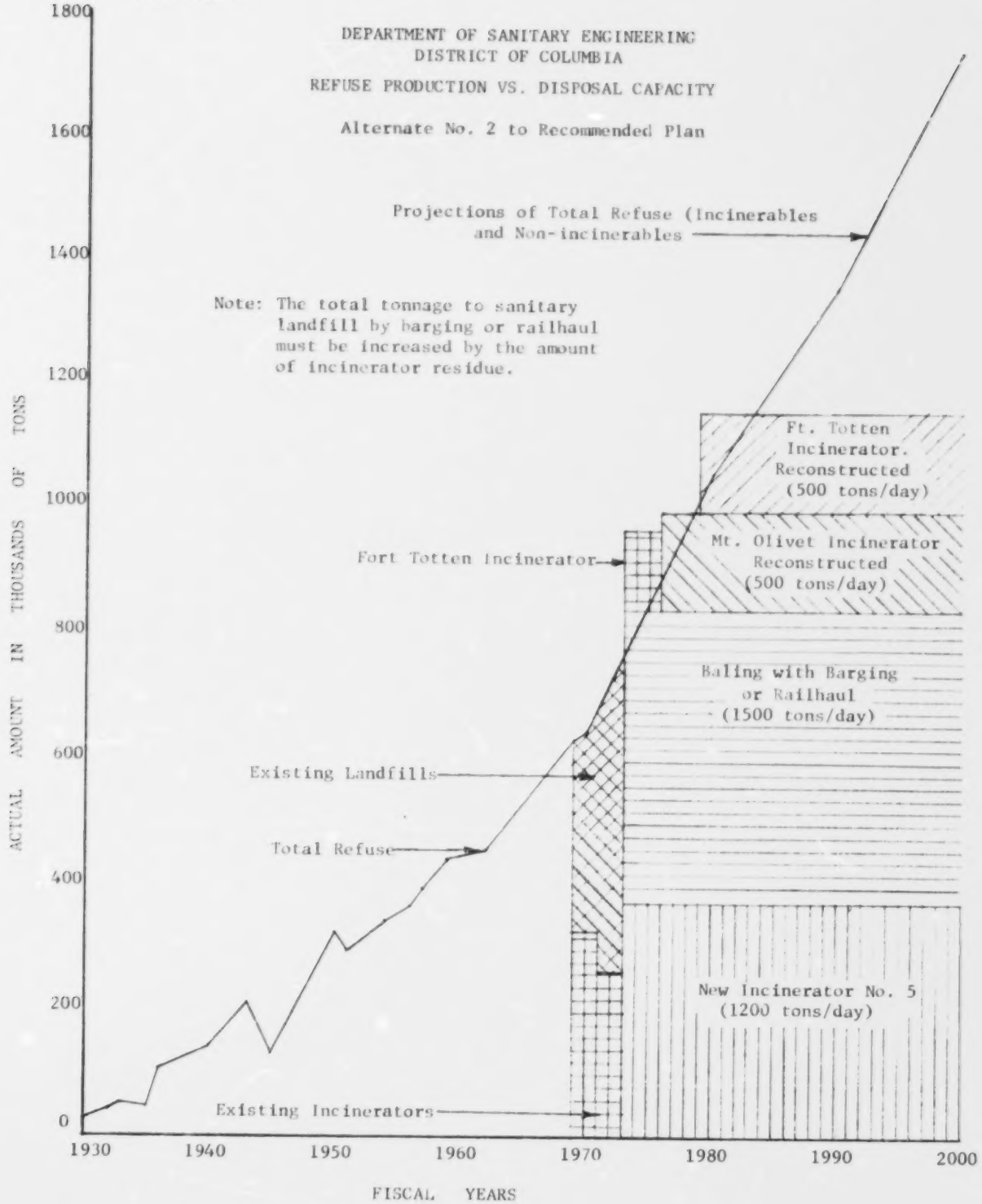

DEPARTMENT OF SANITARY ENGINEERING
DISTRICT OF COLUMBIA
REFUSE PRODUCTION VS. DISPOSAL CAPACITY
Alternate No. 1 to Recommended Plan
Projections of Total Refuse (incinerables and Non-incinerables)
Note: The total tonnage to sanitary landfill by barging or railhaul must be increased by the amount of incinerator residue.
Railhaul Contract
Additional Baling Capacity (500 tons/day)
Existing Landfills
Baling with Barging (1000 tons/day)
Total Refuse
New Incinerator No.5 (1200 tons/day)
Existing Incinerators
ACTUAL AMOUNT IN THOUSANDS OF TONS
1800
1600
1400
1200
1000
800
600
400
200
0
1930
1940
1950
1960
1970
1980
1990
2000
FISCAL YEARS

Chart No. 5


DEPARTMENT OF SANITARY ENGINEERING
DISTRICT OF COLUMBIA
REFUSE PRODUCTION VS. DISPOSAL CAPACITY
Alternate No. 2 to Recommended Plan
Projections of Total Refuse (Incinerables and Non-incinerables
Note: The total tonnage to sanitary landfill by barging or railhaul must be increased by the amount of incinerator residue.
Ft. Totten Incinerator. Reconstructed (500 tons/day)
Mt. Olivet Incinerator Reconstructed (500 tons/day)
Fort Totten Incinerator
Baling with Barging or Railhaul (1500 tons/day)
Existing Landfills
Total Refuse
New Incinerator No. 5 (1200 tons/day)
Existing Incinerators
ACTUAL AMOUNT IN THOUSANDS OF TONS
1800
1600
1400
1200
1000
800
600
400
200
0
1930
1940
1950
1960
1970
1980
1990
2000
FISCAL YEARS

APPENDIX A

PROPOSED HEALTH REGULATIONS
TITLE 8, CHAPTER 3, PART 6
SOLID WASTE REGULATIONS

These proposed regulations developed jointly by representatives of the Department of Economic Development, Department of Sanitary Engineering, and the Health Services Administration constitute an up-dating and substantial revision of the current Police Regulations covering trash and garbage handling. The primary need for revision of the existing regulations stems from a conversion from separate to combined pickup of refuse within the District through the use of compactor trucks. While the changes are not complete as of the moment, combined collection is being instituted in progressive areas of the District as the new compactor trucks become available.

The proposed regulations contain a number of significant features, the most important of which relates to the licensing of private collectors. There has been a continuing problem within the District as a result of improper practices being carried on by a limited number of collectors who are at the present time not subject to any degree of regulation or control. It is anticipated that the regulations will provide an adequate basis on which such control can be established. In addition, the regulations require the installation of food waste grinders in all food handling establishments after an established date as well as the installation of such devices in new residential units or such units which are being substantially remodeled and altered.

Preceding page blank

DISTRICT OF COLUMBIA REGULATIONS

TITLE 8, HEALTH REGULATIONS
CHAPTER 3, BUILDINGS AND GROUNDS
PART 6, SOLID WASTE REGULATIONS

8-3:601 PURPOSE AND SCOPE

(a) Purpose

The purpose of this regulation is to enhance and improve the environment and thus promote the health, safety and welfare of the people of the District of Columbia by establishing minimum standards for the storage, collection, transportation and disposal of solid wastes.

(b) Scope

These regulations shall apply to all solid waste storage, collection, transportation and disposal within the District.

8-3:602 DEFINITIONS

Approved means compliance with published standards specifically applicable to the device, method, thing, procedure, or facility under consideration and which standards have been approved by the Commissioner. In this instance, Commissioner means that official and not his agent.

Abandoned Vehicles means motor vehicles and trailers left on public or private property for an extended period of time and usually in an inoperable or hazardous condition and having only scrap value.

Ashes means the residue from the burning of wood, coal, coke, or other combustible materials.

Baler means a machine used to compress and bind a quantity of solid waste or other material.

Bulky Waste means the large items of solid waste such as appliances, furniture, large auto parts, trees and branches, stumps, flotage, and the like.

Carry Container means a container used to transfer solid wastes from premises to a collection vehicle.

Preceding page blank

Catch Basin means an enlarged and trapped inlet to a sewer designed to capture debris and heavy solids carried by storm or surface water.

Collector means any person who is engaged in the collection or transportation of solid waste.

Combustible Rubbish means miscellaneous burnable materials.

Commissioner means the Commissioner of the District of Columbia or his duly authorized agent.

Compactor Collection Vehicle means an enclosed vehicle provided with special mechanical devices for conveying the refuse into the main compartment of the body and compressing the loaded materials.

Composting means a controlled microbial degradation of organic waste yielding a nuisance free product of potential value as a soil conditioner.

Construction and Demolition Wastes means the waste building materials and rubble resulting from construction, remodeling, repair, and demolition operation on houses, commercial buildings, pavements, and other structures.

Dead Animals means those that die naturally or from disease, or are accidentally killed.

Disposal Area means any site, location, tract of land, area, building, structure or premises used or intended to be used for partial or total solid waste disposal.

District means the District of Columbia.

Domestic Refuse means all those types which normally originate in the residential household or apartment house.

Food Waste (Garbage) means animal and vegetable waste resulting from the storage, handling, preparation, cooking or serving of foods.

Food Waste (Garbage) Grinder means a device for pulverizing food wastes (garbage) for discharge into the sanitary sewerage system.

Hazardous Wastes means those wastes that can cause serious injury or disease during the normal storage, collection and disposal cycle, including but not limited to explosives, pathological and infectious wastes, radioactive materials, and dangerous chemicals.

Incinerator means any equipment, device or contrivance and all appurtenances thereof used for the destruction by burning of solid, semi-solid, liquid or gaseous combustible wastes.

Incinerator Residue means solid materials remaining after reduction in an incinerator.

Industrial Waste means solid wastes which result from industrial processes and manufacturing operations such as factories, processing plants, repair and cleaning establishments, refineries and rendering plants.

Junk means a collection of sorted salvageable materials.

Non-combustible Refuse means miscellaneous refuse materials that are unburnable at ordinary incinerator temperatures (1300°F to 2000°F).

Open Dump means an area on which there is an accumulation of solid waste from one or more sources without proper cover materials.

Person means any individual, firm, partnership, company, corporation, trustee, association, or any other private or public entity.

Premises means a building, together with any fences, walls, sheds, garages, or other accessory buildings appurtenant to such building, and the area of land surrounding the building and actually or by legal construction forming one enclosure in which such building is located.

Putrescible Wastes means wastes that are capable of being decomposed by microorganisms with sufficient rapidity as to cause nuisance from odors, gases, and similar objectionable conditions. Kitchen wastes, offal, and dead animals are examples of putrescible components of solid waste.

Refuse see Solid Waste.

Residue means the solid materials remaining after burning, comprising ash, metal, glass, ceramics, and unburned organic substances.

Rubbish means nonputrescible solid wastes, including ashes, consisting of both combustible and non-combustible wastes, such as paper, cardboard, tin cans, yard rubbish, wood, glass, bedding, crockery, or litter of any kind.

Scavenging means the uncontrolled picking or sorting of solid wastes either before, during or following collection.

Solid Waste (Refuse) means putrescible and nonputrescible solid wastes, except body wastes, and including abandoned vehicles, food waste (garbage), rubbish, ashes, incinerator residue, street cleanings, tree debris, and solid market and industrial wastes.

Solid Waste Storage means the temporary on-site storage of solid waste.

Street Refuse means material picked up by manual or mechanical sweeping of alleys, streets and sidewalks, litter from public litter receptacles, and dirt removed from catch basins.

Waste means useless, unwanted, or discarded materials resulting from normal community activities. Wastes include solids, liquids, and gases. Solid wastes are classed as refuse.

Yard Rubbish means prunings, grass clippings, weeds, leaves, and general yard and garden wastes.

8-3:603 STORAGE OF SOLID WASTES

(a) All solid wastes shall be stored in such manner as not to provide food, harborage or breeding places for insects or rodents, or to create a nuisance or fire hazard.

(b) No person shall deposit, throw or place, or cause to be deposited, thrown or placed any solid waste in any alley, street, catch basin or other public space, or into the Potomac River or other waters in the District, or onto any premises under the control of others.

(c) Containers used for the storage of solid wastes shall be of approved design and materials.

(d) No single filled container or bundle to be collected by the District and to be handled manually shall exceed sixty pounds in weight.

(e) Where containers are used for the storage of rubbish, or a combination of rubbish and food waste (garbage), a sufficient number shall be provided to store such solid wastes which may accumulate on the premises during the usual interval between collections.

(f) Containers shall be kept clean and in good repair.

(g) Ashes shall be stored in metal containers. When stored in the open such containers shall be covered.

(h) Unless food waste (garbage) is disposed of by grinding and flushing to the sanitary sewerage system or is collected by licensed collectors for animal feeding, it shall be drained, wrapped and stored for collection with rubbish.

(i) Solid wastes for collection by the District, excluding bulky wastes handled by special collection, shall be placed at the designated point of collection adjacent to public space on the designated days of collection and not later than 6:00 A.M. on such days.

(j) Liquid wastes shall not be included with solid wastes.

8-3:604 COLLECTION AND TRANSPORTATION

(a) Every premises or part thereof where solid wastes are generated and where such wastes are not collected by the District shall be served by

a licensed collector.

(b) Solid wastes shall be collected at least twice per week unless fewer collections are specifically approved.

(c) Collectors shall not permit spillage from solid waste containers or collection vehicles, or otherwise contribute debris at the point or area of collection.

(d) Containers used for carryout collection service shall be of approved design and materials: Provided, that this subsection shall not be effective until two years after the promulgation of these regulations.

(e) Collection vehicles shall be operated in such manner that they do not create a nuisance, nor shall they be parked in front of any premises other than that occupied by the owner of such vehicle for more than thirty minutes beyond the time they are actually servicing such premises.

(f) Collection vehicles shall be properly maintained and kept clean.

(g) The collection of non-compacted rubbish or a combination of wrapped food waste (garbage) and non-compacted rubbish in other than compactor collection vehicles is prohibited: Provided, that collection vehicles that otherwise comply with these regulations and are in use at the time of the promulgation of these regulations may continue to be used for a period not in excess of three years following the date of promulgation.

8-3:605 SPECIAL COLLECTIONS

(a) Leaves will be collected by the District on announced schedules during the period of September through December. Occupants of premises where leaves accumulate may, in lieu of placing leaves in approved containers, place their leaves in neat piles at the front curb prior to the announced dates of collection. Leaves shall not be permitted to obstruct any thoroughfare, sidewalk, drain or gutter.

(b) Persons occupying premises where solid waste collection service is provided by the District shall notify the Department of Sanitary Engineering when they desire collection of bulky wastes. The safety precautions of Article 39 of the Police Regulations apply to all discarded refrigerators, iceboxes, freezer boxes, and other boxes or containers having a capacity of one and one-half cubic feet or more.

(c) All dead animals, and gross quantities of decayed fish, meat or vegetable products shall be collected in covered vehicles specifically approved for this purpose. It shall be unlawful for any person to interfere in any manner with the collection and disposal of such materials by the District or a licensed collector.

8-3:606 LICENSING

(a) Other than the District, no person shall by himself or otherwise use any vehicle for the collection or transportation of solid wastes in or through the District either for himself or for others without first having obtained a collector's license so to do and a collection vehicle license for each vehicle so used.

(b) Applications for solid waste collector's and collection vehicle licenses shall be submitted on approved forms to the Director of the Department of Economic Development or his duly authorized agent. These applications shall include the name of the person to be licensed and if this be other than an individual, the name and title of the applicant, the address and telephone number of the location to which the license will apply, and the following information concerning each vehicle to be licensed: type, make, year of manufacture, tare weight in pounds, capacity in cubic yards, jurisdiction of registration and motor vehicle license number.

(c) Each vehicle to be licensed shall have the name, business address and telephone number of the licensee, and the vehicle tare weight printed legibly in letters and figures at least four inches in height on each door of the vehicle cab.

(d) No collection vehicle license shall be granted until the vehicle has been inspected by the Director of Health Services Administration or his duly authorized agent and found to comply with the following requirements:

(1) Collection vehicles shall be sufficiently tight to prevent leakage of any drainage from the vehicle.

(2) Where open body vehicles are to be used for the transportation of solid wastes, provision shall be made to prevent the loss of wastes by wind or spillage.

(e) The fees for solid waste collector's and collection vehicle licenses shall be submitted with the applications to the Director of the Department of Economic Development or his duly authorized agent. Licenses shall date from the first day of November of each year and expire on the thirty-first day of the following October, but may be otherwise pro-rated as permitted in Title 47, Section 2305, D. C. Code, 1967 Edition. Each business and each vehicle shall be separately licensed.

(f) The Director of the Department of Economic Development will provide two metal tags with each collection vehicle license issued indicating the collection vehicle license number. Such tags shall be affixed to each side of the body of the respective collection vehicle in such manner as to be clearly visible at all times.

(g) During the period of the validity of each such license, the licensee shall notify the Director of the Department of Economic Development or his duly authorized agent of any change in the information shown on his application within ten days of such change.

(h) Each licensee shall provide off street parking or storage for each collection vehicle and suitable facilities for cleansing the same.

8-3:607 SOLID WASTE REDUCTION AND DISPOSAL

(a) Open burning is prohibited by the Air Quality Control and Fuel Burning Equipment Regulations.

(b) Construction and operation of incinerators shall comply with the applicable provisions of the Air Quality Control and Fuel Burning Equipment Regulations.

(c) Plans for on-site disposal or reduction systems, such as compactors, balers, shredders, grinders and similar installations shall be submitted to the Commissioner for approval prior to installation.

(d) Each food establishment served by a sanitary sewer and conducting activities any of which generate food wastes (garbage) shall have and use one or more food waste (garbage) grinders which are conveniently located to each such activity and which are adequate in capacity to dispose of all readily grindable food wastes (garbage) produced: Provided, that existing food establishments shall not be required to have food waste (garbage) grinders until two years after the date of the promulgation of these regulations. Each kitchen sink that is newly installed in any dwelling unit, or which is replaced or substantially repaired such that a plumbing permit is required, six months or more after these regulations are promulgated, shall be provided with a food waste (garbage) grinder. Food waste grinders shall be maintained in good repair and operating condition.

(e) The operation of an open dump for the disposal of solid waste is prohibited.

(f) Any method for the disposal of solid wastes by the establishment of a disposal area shall be approved and a permit shall be obtained from the Commissioner before such activity is undertaken: Provided, that the controlled composting of leaves is not subject to this requirement.

(g) Hazardous wastes shall be transported and disposed of only by approved methods.

(h) Scavenging is prohibited. Solid wastes shall not be collected or hauled to any central location for the purpose of scavenging: Provided, that licensed junk and second hand dealers may carry out such activities on salvageable materials.

8-3:608 DISPOSAL OF SOLID WASTES AT THE DISTRICT'S INCINERATORS

(a) Solid wastes to be acceptable for disposal at the District's incinerators shall conform with the following requirements:

(1) Shall be readily combustible.

(2) Shall not contain hazardous wastes except as approved.

(3) Shall not contain heavy timbers, logs, stumps or large quantities of ashes, dirt or rubble.

(4) Shall not contain large quantities of rubbish with a high moisture content.

(5) Bulky combustible materials shall not exceed four feet in length or two feet by two feet in cross-section.

(6) Brush and tree debris shall not exceed four feet in length or four inches in diameter.

(7) Timbers may not exceed four feet in length or four inches by four inches or two inches by twelve inches in cross-section.

8-3:609 SUSPENSION OF PRIVATE COLLECTOR'S ACCESS TO DISTRICT DISPOSAL FACILITIES

(a) Solid wastes generated outside the District shall not be delivered to any of the disposal facilities operated by the District unless prior arrangements for acceptance have been made in writing with the Director of the Department of Sanitary Engineering.

(b) Should any licensee or his agent violate this section, all vehicles operated by said licensee may be denied access to any or all District disposal facilities for a period not to exceed thirty days for each such violation. Prior to such denial of access the licensee may request and shall be afforded an administrative hearing by the Director of the Department of Sanitary Engineering or his duly authorized agent on the proposed denial. Nothing in this subsection shall prevent a licensee from being prosecuted for violation on the regulations in this Part.

8-3:610 INSPECTION

(a) The Commissioner is authorized to make such inspections of solid waste storage, containers, collection systems, collection vehicles, collection vehicle storage and cleansing facilities, disposal and reduction facilities, and disposal sites as may be necessary to determine that the intent and purpose of these regulations are being met.

(b) Every premises or part of a premises served by a licensed collector shall maintain evidence including the name and address of the licensee providing such services, which evidence shall be available at all reasonable hours for inspection by the Commissioner.

8-3:611 REVOCATION, SUSPENSION, OR DENIAL, OF SOLID WASTE COLLECTOR'S OR COLLECTION VEHICLE LICENSES

Continued or repeated violation of, or continued or repeated failure to comply with, any of the provisions of this Article shall be grounds for the revocation, suspension, or denial, of any solid waste collector's license or any collection vehicle license: Provided, that the licensee shall be given an opportunity to answer and be heard by the Commissioner upon the charges against him.

8-3:612 PENALTY

Any person who fails to comply with any provision of this Part, or who refuses, interferes with, or prevents any inspection authorized thereby shall be punished by a fine not to exceed $300 or imprisonment not to exceed ninety days, or both. In the event of any violation of, or failure to comply with this Part, each and every day of such violation shall constitute a separate offense and the penalties described herein shall be applicable to each such separate offense.

8-3:613 INDEPENDENCE OF SECTIONS

Each section and every part of each section of this Part is hereby declared independent of every other section or part thereof, and the finding or holding of any section or part thereof to be void or ineffective for cause shall not be deemed to affect any other section or part thereof.

APPENDIX B

SERVICE CHARGES FOR COLLECTION AND
DISPOSAL OF SOLID WASTE

An analysis of the cost of refuse collection and disposal was made to determine the feasibility of charging fees to users of solid waste services.

TABLE 1

OPERATIONAL COSTS OF SERVICE BY TYPE - FY 1969

	Collection	Disposal
Households	$ 4,433,316 $32.89/unit/yr.	$ 873,119 $ 6.48/unit/yr.
District of Columbia facilities	$ 660.128* $48.67/ton	$ 144,418 $ 6.30/ton
Abatement of nuisances (reimbursed)	$ 58,500*	$ 6.30/ton
Cleanup of public space	$ 4,961,357 $134.98/ton	$ 222,910 $ 6.30/ton
Commercial	$126,941**	$ 2,499,342 $ 6.30/ton
Federal	$ 63,470**	$ 213,341 $ 6.30/ton
TOTAL	$10,684,535	$ 3,970,861 $14,655,396

* Now being reimbursed in part.
** Prorated share of garbage collection costs.

Table 1 summarizes departmental costs in fiscal year 1969. The cost to the District of Columbia during FY 1969 for the collection

Preceding page blank

and disposal of solid waste from residential buildings with fewer than four units amounted to $5,306,435. This figure includes trash, garbage, bulky items requiring special pickup, special cleanup drives, and disposal. If this operating cost is prorated among the 134,800 units receiving collection service, the cost for collection is $32.89 per household per year and the disposal cost is $6.48 per household per year or a total of $39.37.

The department also provides services to other District of Columbia facilities such as police stations, fire stations, schools, office buildings, and a variety of institutions. The collection and disposal of solid wastes from these facilities cost the department $804,546 in FY 1969 or $48.67/ton and $6.30/ton for disposal.

The clean up of public space (streets and alleys) cost $4,961,357 or $134.98/ton. This is the highest unit cost operation in the department and results from the large areas that must be covered to collect a ton of material. This cost is expected to be reduced with the increased utilization of mechanical equipment. The disposal of the material collected cost $222,910 or $6.30/ton.

There is a growing practice in this country to view the services rendered in the collection and disposal of solid waste as a utility function and to finance the operation through service charges. This method of financing provides specific identity with the service provided, and income grows approximately in proportion to the growth of the problem. It has the disadvantage of causing a slight increase in the cost of the operation due to the administration of the service charge system.

If solid waste collection and disposal is to become self supporting the service charges which are collected must also include an amount to amortize the facilities constructed.

The recent award of a contract to construct Incinerator No. 5 provides a base for estimating the cost of operation and the amortization for replacement of facilities when required. The estimated future cost of disposal using this technique is shown in Table 2 at $9.81 per ton.

The mobile equipment service shops and the proposed service centers are valued at three million dollars. The shops serve collection, disposal and street cleaning and the costs are spread equally. The service centers will serve collection and street cleaning only, so the assessment is limited to those functions. Using an estimated life of 20 years and an interest rate of 6 percent this adds $1.13 per year per unit to the cost of collection and $ .15 per ton to the cost of disposal.

TABLE 2

CAPITAL INVESTMENT & OPERATING COST ESTIMATE

Incenerator No. 5

Investment Cost		$ 18,080,000
Direct Costs	$/ton	$/year
Labor (3 shifts)	$1.88	$ 704,000
Direct supervision: 1 Superintendent (@ $15,000) 3 Shift foremen (@ $10,000)	.12	45,000
Fringe benefits @ 31.5% of labor & supervision	.63	236,000
Utilities: gas, water, electricity	.79	295,000
Maintenance & supplies @ 2% of investment/yr.	.96	361,600
Residue removal	.83	312,000
Sub-total	5.21	$ 1,954,400
Indirect Costs		
Amortization over 20 years @ 6%	4.20	1,580,000
Administrative overhead @ 20% of labor & supervision	.40	152,100
Sub-total	4.60	1,732,100
TOTAL	9.81	3,471,500

When the amortization costs are added to the operational costs the annual cost for collection increases to $34.17 per household. The disposal cost of $10.06 per household makes a total of $44.23 per year or $3.69 per month. The per ton cost of disposal is $9.81 plus 0.15 for a total of $9.96 for all users.

Recommendations

1. Since continued financing of the program from the General Fund is likely to result in continued budgetary restrictions which prevent a satisfactory job, it is recommended that legislation be developed which would:

a. Authorize the establishment of fees for the collection and/or disposal of solid waste which would be adequate to cover the cost of providing such service including the amortization of the costs of constructing the necessary facilities. The legislation should provide the flexibility necessary to allow the Council to revise rates periodically to reflect changes in costs. Some additional costs will be incurred in the administration of a service charge system. The cost of billing for collection services can be minimized through incorporation into the existing water and sewer billing procedures.

Since it will be very difficult to keep the service fee perfectly coordinated with costs there should also be a provision for using appropriated general funds to supplement the fees whenever the District Council determines that this method of financing is preferable to a rate increase. Surpluses, if any, will be accumulated in the fund to offset unexpected costs.

b. Establish a solid waste fund to receive all service fees and appropriated general funds in reimbursement for the costs of street and alley cleaning, special cleanup of public space and collection of dead animals. All sanitation services would then be financed from this fund.

c. Authorize the sale of bonds or borrowing of funds from the United States Treasury adequate to construct facilities or purchase equipment necessary to provide the collection or disposal service.

2. Cleaning of Public Space

It is recommended that the costs of street and alley cleaning, special cleanup of public space, and collection of dead animals continue to be financed by appropriated general funds. This should be accomplished by an annual appropriation to the solid waste fund adequate to defray the cost of cleaning public space. Records should be maintained of the cost of such services in order to enable supplementary appropriations to the fund whenever services requested exceed normal levels.

3. Collection and Disposal Charges to Tax Free Institutions

It is recommended that a charge be developed to cover collection and disposal costs provided tax free institutions. A fee would be developed for each institution which would include the cost of labor and equipment considering the amount of refuse and accessibility of the storage site.

The collection of the fees for this service would be through individual billing or along with the water and sewer bills.

4. Collection and Disposal Charges to District of Columbia Facilities

It is recommended that the service charge to cover the collection and disposal services provided District of Columbia agencies continue. Fees should be developed for each agency considering the cost of labor and equipment required for the services rendered. No change would be made to the present reimbursement procedures which is by transfer of appropriations.

5. Collection and Disposal Charges for Abatement of Nuisances

The costs of cleanup of private property are at present being charged the owners of the property. Bills are sent to the Health Services Administration to cover the cost of labor and equipment required for each case. The Health Services Administration in turn bills the owner of the property and collects the charges. An additional charge should be added to this fee for disposal of the solid waste. No changes in the method of collecting these fees for abatement of nuisances on private property is recommended.

6. Manpower Utilization and Productivity

The program to improve the utilization and productivity of manpower should be expedited. This program includes equitable workload distribution through proper collection route design, productivity analysis to reward above average performance and provision of the optimum tools and mechanical equipment to carry out the collection and disposal function. Such a program will improve the morale and attitude of sanitation workers as well as provide better service at a reduced cost.

SUMMARY OF EXPENDITURES SANITATION DIVISION
DEPARTMENT OF SANITARY ENGINEERING
FOR FISCAL YEAR 1969

	Total Expenditures FY - 1969	Sanitation Division (General Fund)	Reimbursements (All Sources)
Collection			
Garbage	$ 1,269,407	$ 1,204,190	$ 5,217
Trash	3,272,111	3,257,744	14,367
Ash & special services	975,003	820,181	154,822
Household	468,002	466,095	1,907
Special cleanup drives	58,500	57,261	239
Public space	39,000	38,842	158
Abatement of nuisances	58,500		58,500
D. C. buildings' trash	331,501	237,563	93,938
Dead animals	19,500	19,420	80
Street & alley cleaning	4,902,857	4,837,154	65,703
Snow removal	265,157	23,412	241,745
Total Collection	$10,684,535	$10,202,681	$ 481,854
Disposal			
Incineration	2,887,456	2,875,600	11,856
Landfill	1,083,405	1,078,900	4,505
Total Disposal	$ 3,970,861	$ 3,954,500	$ 16,361
Total	$14,655,396	$14,157,181	$ 498,215

DISTRIBTUION OF EXPENDITURES CONT.

	Commercial	Federal	Household Units Less than Four	Household Units Four or More	General Fund	Private Reimbursement	District of Columbia Departments
Collection							
Garbage	$ 126,941	$63,470	$ 634,703	$380,823			$ 63,470
Trash			3,272,111				
Ash & special services							
Household			468,002				
Special cleanup drives			58,500				
Public space					$ 39,000		
Abatement of nuisances						$58,500	
D. C. buildings' trash							331,501
Dead animals					19,500		
Street and alley cleaning					4,902,857		
Snow removal							265,157
Total Collection	$ 126,941	$63,470	$4,433,316	$380,823	$4,961,357	$58,500	$660,128
Disposal							
Inceneration	$ 2,446,306	$205,092	$ 872,265	$ 12,562	$ 218,887	$ 4,994	$113,676
Landfill	53,036	8,249	854	81	4,023	94	30,742
Total Disposal	$ 2,499,342	$213,341	$ 873,119	$ 12,643	$ 222,910	$ 5,088	$144,418
Total	$ 2,626,283	$276,811	$5,306,435	$393,466	$5,184,267	$63,588	$804,546

APPENDIX C

DEMOLITION AND EXCAVATION

Demolition

Debris and rubble generated by demolition during 1968 amounted to approximately 520,000 cubic yards. This estimate originates from a study made by the District of Columbia Demolition Contractors Association. Data as contained in the real property file maintained by the District of Columbia and data maintained by other government and private organizations substantiate this figure.

The presence of such variables as civil disorders, special cleanup campaigns, use of on-site disposal (burning or basement fill), urban renewal, reduction in salvage operations, federal construction, and other accelerating generators will continually affect the value of the estimate. Other factors include variances in amounts legally disposed of due to landfill site availability; shifts in public attitude as to the relative merits of renovation over demolition; and the employment of the city's condemnation powers. The city government is not charged with the responsibility for handling or disposing of demolition material.

The Bureau of Sanitation Services collects only such demolition debris as that resulting from normal household maintenance, if left for collection in proper containers, and from on-site collections of the cleanups of lots under Commissioner's Orders. Collections are not made for material generated by federal activities or from clearly commercial ventures.

There is little direct control over the management of the solid waste which results from demolition of buildings. The Bureau of Licenses and Inspections issues permits to raze buildings; Chapter 21 of the Police Regulations provides that all non-federal demolition of structures performed within the District must be covered by such a permit. It is the general intent of this law to provide for public safety. Files of the applications for these permits are maintained by the Bureau of Licenses and Inspections and are comprehensive where structures are demolished. Permits do not cover demolition of interiors of structures. Pertinent entries include external building dimensions, material of construction, and number of floors. Desirable statistics such as basement volumes, partitioning, reinforcing or design capacities, type of roof, and volume of debris expected are not provided. Two buildings of similar description and dimension on these

Preceding page blank

forms could differ greatly in the amount of debris, however, so this is an inaccurate source of data on generation.

Of the 23 local contractors actively bidding on contracts for demolition, twelve perform over 90 percent of the volume contracted; the remainder is performed by owners, by firms contracted to build on the site, and by smaller contractors and scavengers. The contracts to raze include provision for removal of debris. These contractors frequently subcontract for removal of debris from the larger jobs. Contractors often ignore landfill sites provided by the city and carry debris to closer sites privately owned. Theoretically, these are areas whose owners have given permission for dumping. Malpractice instances have been reported such as after hour dumping at adjacent or nearby construction and demolition sites. There are two large private landfills in Virginia and two in Maryland, which conduct some salvage separation. They are generally well maintained. Smaller sites are available from time to time throughout the area, but as they are at a premium, the contractors are loath to publicize their whereabouts.

The two major restrictions on municipal disposal at municipal facilities which induce the contractors to seek private landfills are segregation and location. Since only non-floating material is accepted at Dyke Marsh and plaster, bricks and other bulky rubble are not accepted at Oxon Cove, brick and concrete materials must be separated from wood and other degradable materials. The cost of labor required to separate these materials makes such disposal uneconomical for large scale contractors. The Dyke Marsh Landfill and all future landfill sites contemplated are remote from most demolition sites. Both of these factors encourage contractors to provide their own sites.

Demolition contractors generally subcontract for rolling stock to transport the material to disposal. A representative of the trade association of transportation contractors estimates that members haul 600,000 cubic yards annually from sites within the District, and place this volume as 90 percent of the city's total. This figure generally substantiates the estimate of the District of Columbia Demolition Contractors Association.

Excavation

Solid wastes resulting from excavation amounted to approximately 1.8 million cubic yards. This amount is expected to increase to 2.5 million with the advent of increased highway construction and the construction of the subway system. Disposal is handled by the excavators without municipal management. The three major sources in the future will be construction of highways, buildings and subways. Other contributing operations are harbor dredging, utility line emplacement, and landscaping.

Most excavated material is suitable fill and is employed in filling marshy or swampy areas, in making embankments and in landscaping. The Department of Sanitary Engineering provides a disposal site at Dyke Marsh. River bottom excavation and dredging is monitored by the Corps of Engineers which enforces pollution control standards. The Department of Highways and Traffic coordinates with the Redevelopment Land Agency and the Bureau of Public Roads to provide borrow. The Bureau of Public Roads manages earth moving in the metropolitan area to provide a balancing of cut and fill among the several highway departments.

There are no records maintained on amounts excavated. Estimates of the annual rate of generation, which were made by the excavators who perform major earth moving in the District, total 2,500,000 cubic yards.

The largest single source of excavation waste during the next several years will be the construction of the subway system. The volume is expected to be 8 million cubic yards from excavation within the District and twenty million from the metropolitan area. Peak yearly rates will occur between 1972 and 1974; completion is scheduled for the 1980's.

The Department of Highways and Traffic expects to produce between 2 and 6 million cubic yards by construction of the interstate system. These figures are based on estimated cuts of 9 million cubic yards against 4.7 million cubic yards of fill. If cut and fill sections are unexpectedly re-scheduled, excess fill may result at one time and borrow may be needed later. Elevated sections may be converted to cut and cover sections as new legislation on air-space rights is formulated. The construction of non-interstate roads will contribute 120,000 cubic yards of spoil.

The Department of Licenses and Inspections maintains files of applications for construction; they exclude federal construction, but include all commercial and private construction and redevelopment actions by the Redevelopment Land Agency and National Capital Housing Authority. The files indicate an average volume of over 1 million cubic yards of excavation annually. The D. C. Contract Haulers Association has estimated all building construction excavation, including federal, at 1.6 million cubic yards. F. W. Dodge, Inc., which compiles a newsletter of construction data for contractors' information, estimates this excavation volume

at 1.8 million cubic yards per year.

Utilities with underground duct systems produce an annual average excavation waste of 100,000 cubic yards. Two fifths of this total results from water and sewer main construction, two-fifths from electrical power duct laying, and one-fifth from laying telephone ducts.

Dredging of the Potomac and Anacostia Rivers is the responsibility of the Corps of Engineers. Every three years 50,000 cubic yards of material is dredged from the Anacostia and deposited by agreement on adjacent property owned by the National Park Service and others. The capacity of acceptable fill areas is being exhausted and alternatives such as barging or piping to downstream disposal must soon be considered. While the Potomac River is generally self-cleansing within the District, at 10 year intervals the area south of Washington National Airport at the Four Mile Run discharge point must be dredged.

APPENDIX D

COMMERCIAL HAULERS AND U. S. GOVERNMENT HAULERS

The refuse collected by commercial haulers and by U. S. Government haulers amounted to 435,000 tons or 3,453,775 cubic yards in FY 1968. Of this total, 35,000 tons were carried by federal installations collecting their own accumulations and 400,000 tons by commercial haulers. However, 81,000 tons hauled commercially were generated at federal installations.

Residential establishments larger than three units as well as commercial establishments must arrange for trash collection through private contractors. At least 11 private collectors each have four or more packer trucks at their disposal. Smaller companies, however, are permitted to operate with marginal equipment. These private collectors deposit the trash at District incinerators. However, the Bureau of Sanitation Services has priority. When the incinerator storage space is exhausted the private collectors must deposit the trash at sanitary landfills.

There is no centralized management of solid waste generated at federal facilities. Disposal service is provided at Bureau of Sanitation Services facilities on the same no-charge basis as for commercial enterprise. Volumes deposited by those trucks which are marked U. S. Government are recorded at the municipal landfills and incenerators.

The District does not require a permit to dump. Such a requirement would make it less difficult to prevent disposal of wastes generated outside the municipal limits.

Refuse has been generated within the District at a constant rate during the past several years. It is expected that on-site volume reduction practices and salvage efforts will become more prevalent as agencies and enterprises become more aware of potential savings. These practices result in a decrease in the amount of solid waste reaching the District disposal facilities, and should offset increases in the amount generated.

There is no available estimate of the total amount of classified document destruction in the city; 1,788 tons of classified waste were collected in 1968 and brought to municipal facilities for destruction (See Chapter 5, Disposal), but many agencies burn or otherwise destroy their material on-site.

The total of all quantities of solid waste reported by several agencies in the District in 1968 was 969,950 cubic yards of uncompacted

refuse. Of this amount 43,450 cubic yards were reusable and were sold as salvage. Federally owned incinerators handled 42,000 cubic yards. Municipal facilities received the remaining 884,500 cubic yards or 92 percent of the total; 647,300 cubic yards were reported delivered by contractors and 237,200 cubic yards by federally owned trucks. The actual amount in federal trucks reported by District monitors stationed at the disposal sites amounted to 279,487 cubic yards. The difference in the federal figures could be attributed to the following factors:

1. Unauthorized dumping by federal agencies not located within the District.

2. Unscheduled or sporadic delivery.

3. Inaccuracies in estimating by those agencies which maintain no records.

4. Incomplete data due to inability to identify all agencies contributing.

5. Failure of monitors to identify trucks as federal, due to poor or improper marking.

FEDERAL REFUSE: FY 1968

	Agency	Disposal	Collector	Volume in Cubic yards
1.	Bolling A.F.B.	Municipal	Contractor	140,880
2.	Capital Grounds Division	Municipal	Self	3,000
3.	Civil Aeronautics Board	Municipal	Contractor	Unknown
4.	Corps of Engineers (harbor debris)	Municipal	Contractor	2,736
5.	Executive Office Building	Municipal Salvage	Contractor Contractor	480 300
6.	Federal Bureau of Investigation	Municipal Classified	Self	3,000
7.	Freedman's Hospital	Municipal	Self	30,000
8.	Government Printing Office	Municipal Salvage	Self Contractor	8,746 40,000
9.	General Services Administration	Municipal Municipal Salvage	Self Contractor Contractor	55,000 84,000 155,000
10.	Howard University	Municipal	Self	65,200
11.	Library of Congress	Municipal	Contractor	5,290
12.	Marine Barracks	Municipal	Contractor	6,000
13.	National Park Service	Municipal Municipal	Contractor Self	23,100 54,260
14.	National Zoological Park	Own Property	Self	20,000
15.	Old Soldiers Home	Own Property	Self	10,000
16.	Post Office	Municipal	Contractor	13,760
17.	St. Elizabeths Hospital	Own Property	Self	12,000
18.	Camp Sims	Municipal	Contractor	2,000

	Disposal	Collector	Volume in Cubic yards
19. Smithsonian Institution	Municipal	Contractor	6,908
20. Social Secutity and Internal Revenue Service	Municipal	Contractor	3,000
21. Treasury Department			
Bureau of Engraving & Printing	Municipal Salvage	Contractor Contractor	27,597 3,148
Main Treasury & Annex	Municipal	Contractor	5,480
22. U. S. Army:			
Harry Diamond Labs	Municipal	Contractor	8,000
Walter Reed Army Medical Center	Municipal	Contractor	70,000
Fort McNair	Municipal	Contractor	43,800
23. U. S. Navy:	Municipal	Contractor	
Observatory			3,750
Security Station			13,950
Research Laboratories			20,924
Washington Navy Yard			137,872
Bellevue Housing			27,768
24. Veterans Administration Hospital	Municipal	Self	8,000

APPENDIX E

ABANDONED AUTOMOBILES

The Metropolitan Police Department is responsible for the collection and disposal of abandoned vehicles. Sixty percent of the collection and disposal operations are handled by private contractors under the supervision of the Police Department; the remainder is handled by the department itself. Since July 1963, the department efforts resulted in the removal of approximately 24,000 vehicles at an average rate of 4,800 vehicles annually. A high density of these are found in the N.E. sector adjacent to Prince George County, Maryland. Many automobiles of various values remain in alleys and in garages, front and rear yards vacant lots and other private spaces.

Police officer reports and requests from the citizenry originate most complaints. Other District agencies, such as those concerned with housing, public health, fire, and refuse collection service, also originate such complaints. All referrals are processed through the Community Relations Division of the Police Department.

When cars are abandoned on public space, they are ticketed. After five days the vehicles are towed to staging lots near precinct station houses. The vehicles are kept there for five more days during which owners can claim them by paying towing charges. Cars remaining after the five day period are then taken to an impoundment lot located at Blue Plains. A six month holding period is observed at the Blue Plains impoundment facility to permit car owners to secure their property after payment for towing charges and penalties. Upon expiration of the holding period, an auction is held and all cars not sold to bidders are hauled to scrap dealers.

Currently, the profit in separating metals for reuse is marginal. As improved processes can be developed to separate reusable metals, the problem of abandoned cars will be lessened.

A major reason for the excessive accumulation of abandoned autos is an increase in auto thefts and stripping. The incidence of abandoned and stripped autos is related to certain neighborhood socio-economic characteristics. The police precincts reporting the highest crime rate are those which have the most abandonments. City police officials

estimate that nearly twenty-five percent of the abandoned cars collected in the District are titled in nearby Maryland and Virginia.

Surrounding communities have a less acute problem in handling abandoned autos. They have shorter detention requirements, and in many instances contract directly with the scrapper for both removal and storage.

APPENDIX F

OTHER DISTRICT OF COLUMBIA COLLECTIONS

District of Columbia collections other than those collected by the Bureau of Sanitation Services amounted to 20,284 tons or 126,358 cubic yards in FY 1968. This includes the sewage screenings, grit and catch basin cleanings collected by the Sewer Operations Division and the refuse from the Department of Buildings and Grounds and the Department of Highways and Traffic delivered to municipal disposal points.

Sewage Screenings and Grit

Sewage screenings, the coarse substances suspended or floating in sewage which are large enough to be screened out of the flowing water, are collected at each sewage pumping station and stored on-site in 32-gallon metal containers. A crew consisting of a driver and laborer, using an open-body, four cubic yard capacity dump truck, collects the screenings from all of the sewage pumping stations.

The screenings are taken to the municipal transfer station, transferred to railroad gondola cars and shipped to the Cherry Hill Sanitary Landfill. If gondola space is unavailable, the screenings are taken to other landfills.

Grit, sand and other heavy and inert matter that collects in the grit chambers at the Water Pollution Control Plant is removed by three truck drivers, one per eight hour shift, using a six cubic yard capacity dump truck. The grit chambers are mechanically emptied by means of a conveyor belt. Since the grit also contains putrescible matter, it is transported to the transfer station, transferred to railroad gondola cars and taken to the Cherry Hill Sanitary Landfill with the screenings.

The quantities and projections of sewage screenings and grit are shown on the following page.

QUANTITIES MEASURED IN SPECIAL STUDY FOR FY-1967 WITH ESTIMATED QUANTITIES FOR 1970, 1975 & 1980

SCREENINGS

	FY - 1967	1970	1975	1980
Volume, cu.yds.	1,951	1,980	2,115	2,275
Weight, tons	649	660	705	760
Sewage flow, mg	79,800	81,030	86,505	93,075
Density/lbs./cu. yds	665	---	---	---
Lbs./mg	16.3	---	---	---
Cu. ft./mg	0.66	---	---	---

GRIT

	FY - 1967	1970	1975	1980
Volume, cu. yds.	4,690	4,800	5,130	5,520
Weight, tons	5,323	5,410	5,770	6,210
Sewage flow, mg	79,800	81,030	86,505	93,075
Density/lbs./cu. yds.	2,270	---	---	---
Lbs./mg	133.4	---	---	---
Cu. ft./mg	1.6	---	---	---

Catch Basin Cleaning

There are approximately 21,600 catch basins within the District of Columbia. Their cleaning is the responsibility of the Sewer Maintenance Branch of the Sewer Operations Division. The branch has reorganized this function as a result of recent studies which showed that a six month cleaning cycle — which produces an average debris accumulation of 9 to 12 inches — was the optimal frequency for all but a few problem catch basins. The average crew productivity was 24 basins per day at this frequency.

To attain this schedule, one vacuum crew is assigned to each of seven sections of the city. The sections are adjusted to enable each crew to finish its area within the six month period.

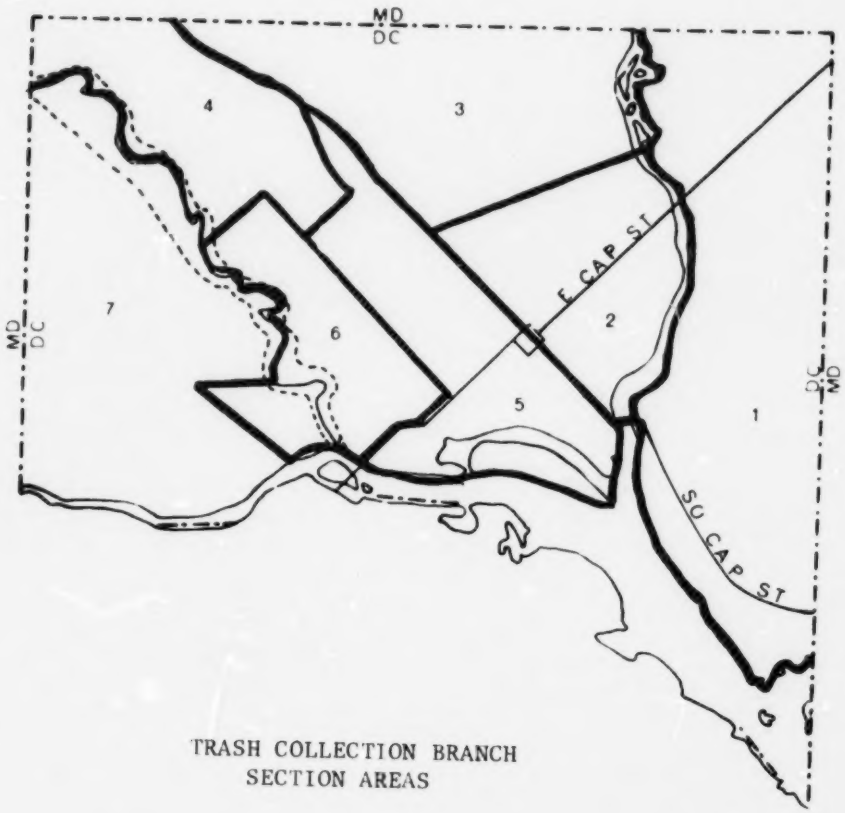
The studies also showed that the previous method of manually cleaning the basins covered only an average of seven catch basins per day while a vacuum crew can clean an average of 24 basins. A vacuum crew averages two loads per day of 9 to 13 cubic yards each while a manual crew averages one load of 2 to 3 cubic yards per day. Mechanical cleaning is easier and neater than manual cleaning; it is also more thorough since a substantial part of the fine material is also collected.

Studies regarding the effects of rainfall on the quantity of solids in the catch basin, the quantity of screenings and the quantity of grit and sand are being conducted.

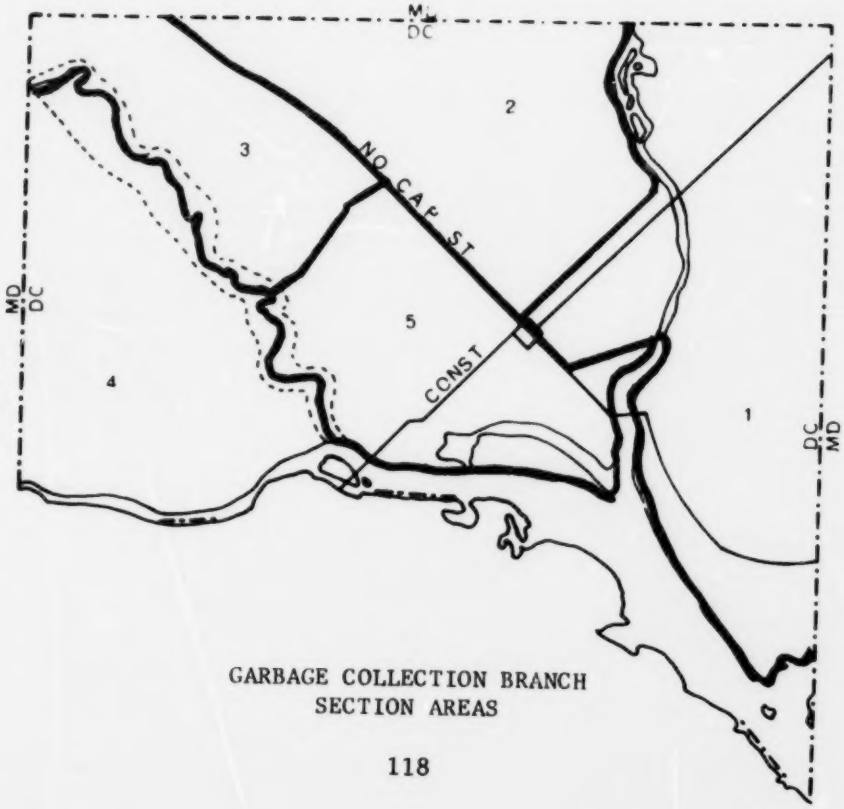
APPENDIX G

BOUNDARY MAPS OF EXISTING COLLECTION BRANCHES AND OF PROPOSED COLLECTION DISTRICTS

Preceding page blank



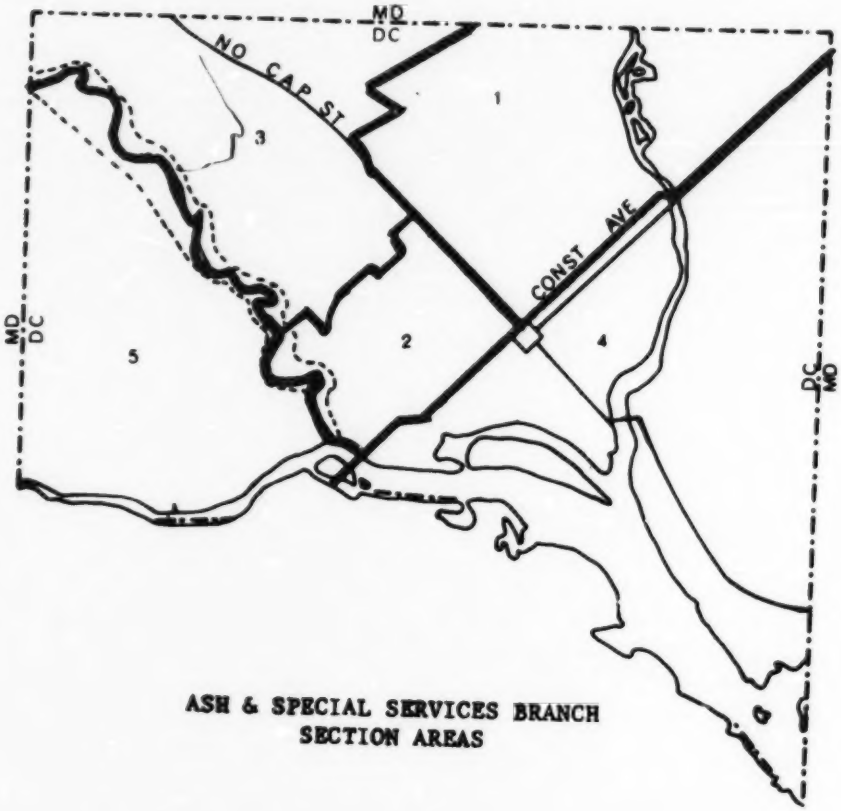
TRASH COLLECTION BRANCH
SECTION AREAS



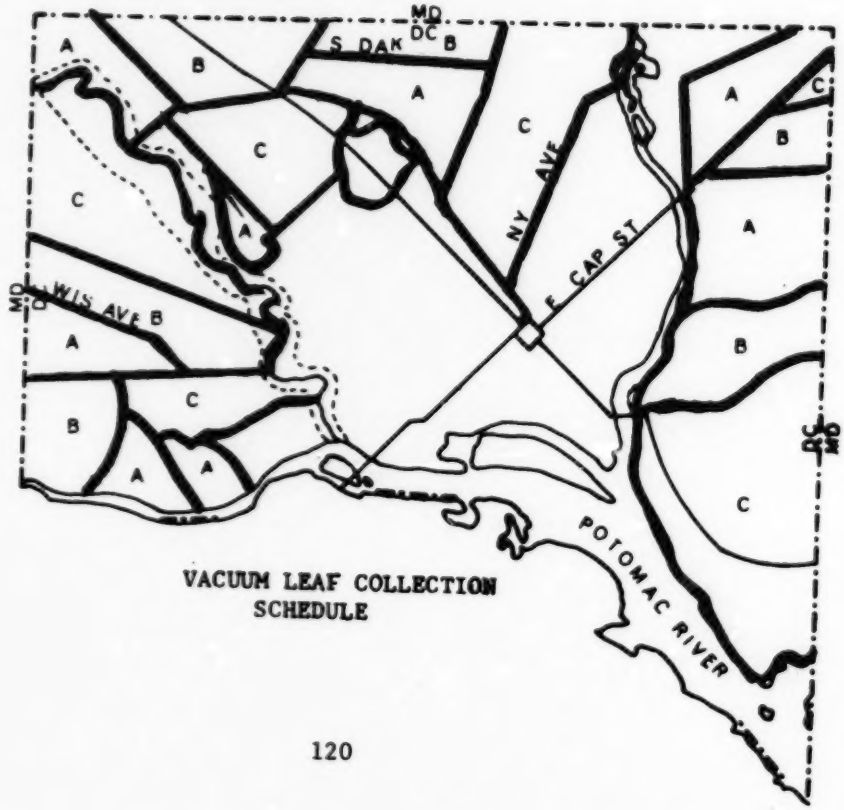
GARBAGE COLLECTION BRANCH
SECTION AREAS

STREET CLEANING BRANCH
ALLEY SECTIONS

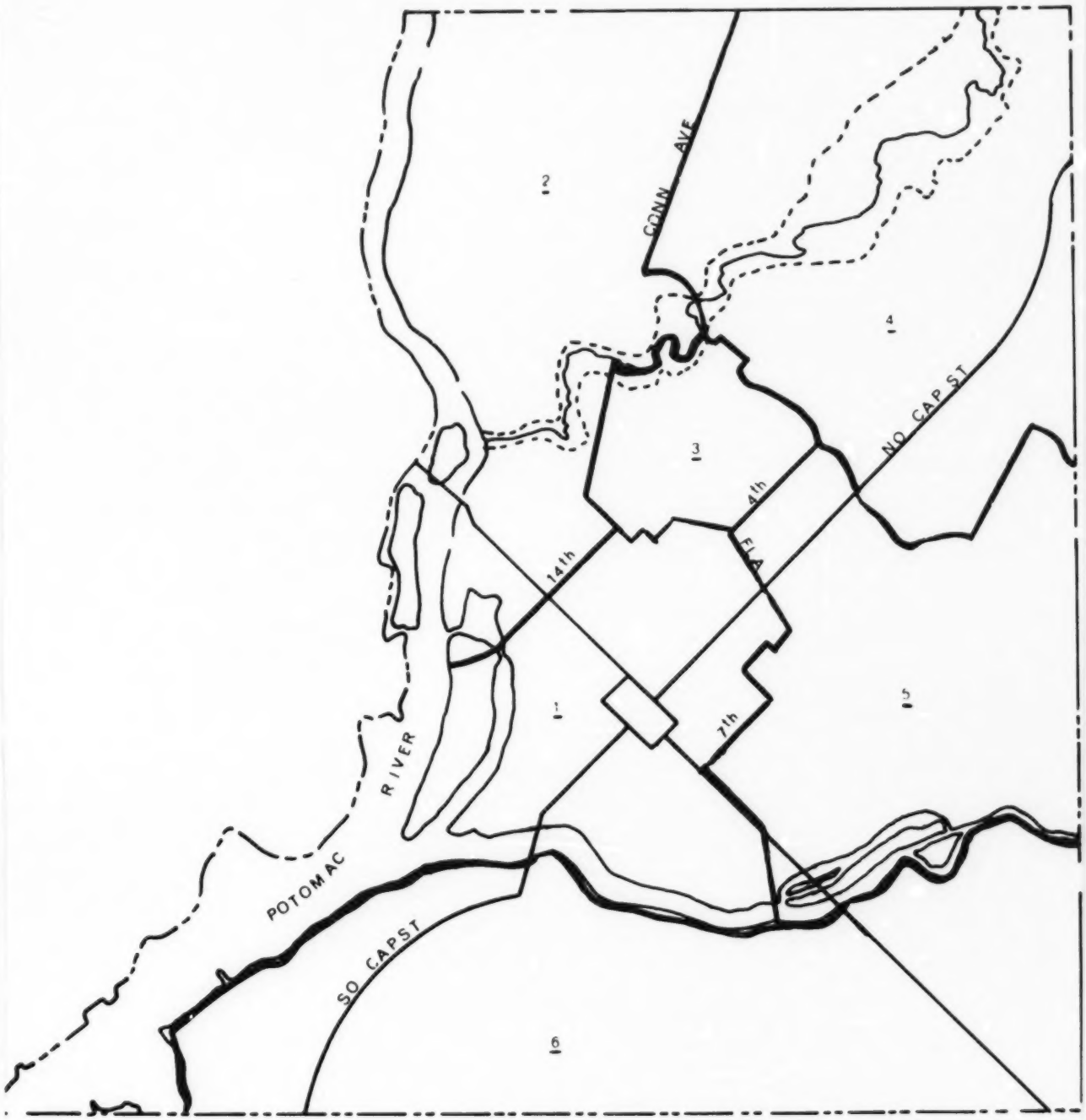
STREET CLEANING BRANCH
STREET SECTIONS



ASH & SPECIAL SERVICES BRANCH
SECTION AREAS



VACUUM LEAF COLLECTION
SCHEDULE



PROPOSED BOUNDARIES FOR SANITATION DISTRICTS UNDER THE REORGANIZATION OF BUREAU OF SANITATION SERVICES ON AN AREA-BASED SYSTEM OF CONTROL

APPENDIX H

PROPOSED OPERATION OF AN AREA-BASED COLLECTION ORGANIZATION

I. ORGANIZATION

The organization of a typical sanitation district will consist of a supervisory and office force, refuse collection crews, street cleaning crews, and a dead animal collector. The office of the district chief will consist of the chief, deputy chief, a dispatcher at the same level as the foreman and a scheduling clerk.

There will be five foremen assigned to the area; four of these will have a regular assignment of a section, the fifth being an assistant foreman who will replace the other foremen during their absence and when all are present, he will assist the dispatcher in scheduling and assigning crews.

There will be fourteen refuse collection crews. These will consist of thirteen assigned to regular twice weekly collection routes and the fourteenth assigned to schools and special collection as required.

There will be one dead animal collector assigned to the area.

There will be four street cleaning crews consisting of a mechanical street cleaning driver and a street cleaning broomer or mechanical sweeper driver assistant.

There will be six laborers assigned to cart routes.

II. TRAINING

Three separate training programs will be given. One will be for the district chief's office personnel and the foremen, the second for the collection crews and the third for the street cleaning personnel. The instructions given to the district chief, foreman, dispatcher and scheduling clerk will include the training given all supervisors plus special emphasis on the area concept, scheduling of personnel following prescribed procedures, reports analysis aimed at the specific reports that will be presented, workload responsibilities in relation to Area 6, and finally, the inspection requirements that they will be required to carry out.

Preceding page blank

The training to be given to the collection crews will consist of the description of the area-based concept of organization, the proper method of handling and picking up of refuse, the proper operation of the packer, proper safety practices, how the concept of the area organization will be implemented and finally, the audits of the routes to assure proper workload distribution.

The street cleaning program will cover the same points as the collection crews' program but will be designed for the former.

III. DISPATCHING AND SCHEDULING

The dispatching and scheduling operation will be conducted through a master monthly schedule and a daily work assignment sheet prepared the day before the regular work day. The daily sheet will designate the work assignments and personnel assigned for each crew. The scheduled time to begin and complete each task is entered by the dispatcher, along with a brief description of the task, the location where the task is to be performed, and the sequence of performance of tasks.

Refuse collection crews. Refuse collection crews assigned to collection routes will cover routes on Monday and Thursday and Tuesday and Friday. On Wednesday the tasks will be described identifying the alleys to be cleaned, streets to be cleaned, special collections to be made and so forth throughout the normal work day. Scheduling of each task will allow time for travel to and from the site and time to accomplish the given workload. Each task will be assigned a beginning and completion clock time. Thirty minutes will be allowed at the end of each day as an incentive.

Schools, Special Collections and Complaints. The school collection crew will work during the hours of 9:30 to 5:00 to provide for special collections after the finish of the normal work day of the remainder of the area personnel. A task sheet will be prepared for the special collection crew in the same manner as for the Wednesday work of the normal refuse route collection crews. The time and amount of each load taken to the disposal point will be entered by the driver.

Street Cleaning. The work should also be planned for the mechanical sweeper driver. Again the scheduled time to begin and complete each portion of the route will be entered or, in the case of following the designated routes, the route number will be entered. The task will describe the route or portion of route to be cleaned and the driver will enter the actual beginning and completion times. The driver will also enter in the task portion the time and size of the load deposited at his dumping point and the location of the dumping point.

The work plan for the assistant to the mechanical sweeper will outline the areas and the time scheduled for the man to sweep the refuse into the street for pickup by the sweeper. This schedule will be

coordinated with the mechanical sweeper route schedule.

Cart Route. The cart route assignments will be made showing the confines of a normal route along with changes or additions. The cart man should enter the number of bags filled and the location where these bags were deposited.

Mechanical Sweeper Pickup. The mechanical sweeper pickup truck will be scheduled to coordinate with the mechanical sweeper driver. His pickups should be scheduled so that they will follow the time for the last dump of the mechanical sweeper.

Dead Animal Collections. Calls for dead animal collections will be made to the area office and scheduled in a similar manner to the task assignments for other crews.

Complaints. Complaints and service calls will be received in the area office and assigned by the dispatcher to the appropriate crew in the most expeditious manner possible. For the most part the school and special collection crew will be assigned most service calls; however, other crews can also be assigned as necessary.

Dispatching. Crews and drivers will be dispatched in accordance with the work plans which have been prepared on the preceding day. Late changes due to absenteeism and additional task requests should be prepared in the morning prior to the dispatch time of the crew. Every attempt should be made to have the crews and workers leave on time. The foremen, assistant foremen or deputy chiefs should bring latecomers and replacement personnel to scheduled crew locations at the time the latecomers arrive.

Monthly Schedule. The monthly schedule for the area will be prepared by the dispatcher and scheduler in a Gantt chart-type presentation. The job, task or workload that is routinely scheduled will be listed on the left side of the sheet with the days and weeks of the month displayed across the top. On the bottom of the line extending from the task description, the days on which the task is to be performed will be entered. On the top of the line the days that the task is actually performed will be entered.

IV. INSPECTION

Inspections will be performed periodically or at random intervals by the foremen, district chiefs and inspectors from the Bureau of Sanitation Services Operations Analysis Division. A cleaning inspection report should be filled out for each inspection made. The area in which the inspection is made should be noted, the district chief's name, the foreman responsible and the inspector if he makes the inspection. The locations covered by the inspection should show

the approximate geographic area. Items to be inspected in street cleaning will be the main street area, the curb area, tree boxes, sidewalks and alleyways. Items to be inspected in collection will be the pickup points and surrounding areas, street or alley area surrounding the pickup point, the condition of the containers and the condition of street boxes. The rating codes to be used are: superior -- those areas much better cleaned than would normally be expected; outstanding -- those areas relatively free of litter, and clearly above the average; acceptable -- those areas of average condition with the normal amount of litter and effort by the cleaning personnel; fair -- those areas of a less than acceptable condition which require improvement; poor -- those areas which would ordinarily create a complaint by anyone casually observing the area. Specific items relating to the ratings should be listed as special comments. In the future these comments should be used to describe more adequately the conditions expected of the rating codes.

Each foreman should inspect his entire area each month. The branch chief's office should make periodic checks of each of the foreman's areas. The frequency of inspection by the district chief will depend upon the quality of the foreman's report, but at a minimum, he should make two inspection in each foreman's area per month.

The Operations Analysis Division inspectors will make their inspections periodically throughout all areas. The purpose of these inspections will be to instruct the district chief or foreman in the technique of conducting inspections, to maintain consistancy in inspections, to evaluate differences among the branches and to analyze those areas where complaints are frequent.

V. MANAGEMENT REPORTS

Crew and Personnel Performance. Reports should be prepared to show the actual performance of personnel against the standard performance, the amounts of refuse collected by the various methods, and an analysis of complaints by type and area. The performance report will show for each crew or individual the amounts of refuse collected and the time spent in collecting it in comparison to the amount scheduled to be collected and the time allowed for collection. Also, the year-to-date performance against the weight schedule, and the performance against the time schedule will be tabulated.

Sanitation District Performance. The sanitation district performance analysis should show the ability of the district to follow the pre-established schedule as laid out on the Gantt charts by the dispatcher, scheduler and foreman. This report is divided into a direct labor section, which shows the comparison between the planned distribution and actual distribution of man-hours by type of work for the current month and year-to-date, and the indirect labor section, which shows the planned and actual distribution of supervision, dispatching, scheduling and the leave categories of sick, annual, holiday, other,

AWOL and LWOP; the third portion of the report presents performance data consisting of a summary of data from the individual performance reports.

The labor man-hour portion of this report is used to evaluate the ability to schedule and perform the workload assigned to the district. In any one of the types of labor where the scheduled amount varies from that actually used, a further analysis should be made to determine the cause, since this means that some work either requires more time than allowed to accomplish it or that people are being misassigned.

The performance data portion of this report shows selected data from the above crew and personnel performance report. This portion includes crew performance and weight actually collected as compared to the standard weight projected.

VI. INFORMATION DISSEMINATION TO RESIDENTS

Prior to the implementation of procedures in each new area, information must be given to the residents within the area concerning the methods of handling refuse under the new concept.

Those occupants whose garbage and trash are now collected separately must be informed of the necessity to combine their refuse in single containers for collection. In addition, municipal garbage collections for commercial establishments will no longer be made.

The residents of the area will have to be informed that collections will be made twice weekly rather than once weekly and be notified of the days of the week on which their collections will be made. They should also be advised to put all refuse out on the regular collection day and to put bulky objects and yard refuse out for collection on Wednesday. The driver can put in special requests for heavy metal objects and items which will not go into the packer.

Residents will have to be advised of the new district office telephone number where complaints can be made, since these will no longer be processed at the central Bureau of Sanitation Services office number.

VII. RESCHEDULING ADJOINING SECTIONS

The implementation of the area-based organization and collection practices in a given area will disrupt work in adjacent areas. Some area boundaries overlap with existing section boundaries. The work for the affected crews will have to be rescheduled during the interim period between the implementation of revised adjacent sanitation districts. This rescheduling will be required for trash, garbage and street cleaning routes.

APPENDIX I

METHOD FOR DETERMINING STAFFING REQUIREMENTS FOR THE AREA-BASED SYSTEM OF SOLID WASTE COLLECTION

1. Inventory of Workload

This inventory should be made from the branches as they exist at the present time: household trash collection, garbage collection, ash and special services and street and alley cleaning.

Trash Collection. The inventory of the workload for the trash branch should consist of on-site observation of the crew following each existing route. This should be accomplished by recording the information on the "Collection Stop Data Sheet" and the "Summary Sheet - Trash Collection Data," as shown on the following pages. On the Trash Collection Data Summary Sheet the recorder enters the summary information including the route designation, crew and pertinent information about each load collected. The Collection Stop Data Sheet is prepared to tabulate the detailed information on the location, stop, pickup points, dwelling units and types of containers picked up on each block during the normal run of trash collection.

Garbage Collection. The following information should be gathered regarding garbage collection within the area: Determine the amount of garbage that is collected, the location of commercial establishments where garbage will no longer be collected by District forces and determine those apartments where combined collection will be instituted.

Special Services. Determine the amounts and location of the refuse collected by the Ash and Special Services Branch. From the inventory of trash collected at schools and from discussions with foremen, enter each school by name and location, the truck loads and the type of refuse collected, the number of cans collected from each of the visits to the school.

The amount of workload involved in community cleanup campaigns should be tabulated as follows: the date of the cleanup, the association sponsoring it, the number of loads collected and the number of days involved, and the boundaries of the area.

A listing of the ash collection sites, the frequency of collection and the amounts collected should be tabulated.

Preceding page blank

SE-647T
(2/70)

TRASH COLLECTION DATA

Route_____ Date_____ Day_____ TRUCK No._____ Foreman_____ Recorder_____

Driver_____ Leadman_____ 1._____ 2._____ 3._____

	1st Load	2nd Load	3d Load	4th Load	5th Load	Summary
1. Time at start or finish						Time in field
2. Mileage at start or finish						Travel time
3. Time at first pickup						Loading time
4. Mileage at first pickup						Burlapping time
5. Location of first pickup						Idle time
6. No. of Containers						Mileage on route
7. Number of pickup points						Mileage to & from route
8. Time at last pickup						Total weight in pounds
9. Mileage at last pickup						Temperature _____
10. Location of last pickup						Weather _____
11. No. of men burlapping						1. 2. 3.
12. Man minutes burlapped						One family
13. No. of illegal containers						Two family
14. Weight						Row houses
15. Time of unloading						Four family
16. Location of unloading						

COLLECTION STOP DATA

Date _____
Day _____
Sheet ____ of ____
Time Began _____

TC# _____
Route _____
Load _____
Time Ended _____

Alley - Street
Location W N E S
Description

Location		D.U.	Legal Cans	Illegal Cans *			
Stop No.	P. Points			Box/Bag	Large	Plastic Bag	Other

A tabulation of the collections made from nontaxable or charitible institutions should include the location of the institution, the quantities collected and the frequency of the collection.

Street Cleaning. The street cleaning workload inventory is developed using a map scaled at 1 to 200 and the street cleaning map key (shown below). This key lists the items to be observed and the code to be used in marking the map for the development of the route and the workload.

STREET CLEANING MAP KEY

Type of Area:

LR	Light Residential
DR	Dense Residential
LC	Light Commecial
HC	Heavy Commercial

Additional Details:

SC	Sidewalk to be Cleaned
TC	Sidewalk and Tree Area to be Cleaned
SN	Sidewalk not to be Cleaned
TN	Sidewalk and Tree Area not to be Cleaned
MA	Median Area
O	Pole Boxes
✳	Paper Boxes

Roadway:

A	Asphalt
(R)	Rough
(S)	Smooth
Conc.	Concrete

Type of Equipment Recommended:

MS	Mechanical Sweeper
PS	Push Cart
MM	Mechanical and Man
TR	Truck Crews

Passes Necessary:

(?)	Number of Recommended Passes

Parking:

L	Light
M	Medium
H	Heavy
N	No restriction
BZ	Bus Zone
____	Show parking violation times

Alleys:

AM	More than 10 Feet Wide
AL	Less than 10 Feet Wide
AV	Unsurfaced

Note potential sweeper dumping spots.

The present workload for street cleaning should be developed showing the assignment of truck crews, white wing pushcarts, and mechanical sweepers within the area. This should be obtained from the foreman and noted on a map.

2. Staffing Workload

Refuse Route Planning. Refuse route planning is accomplished using a 1 to 200 scale map of the city and a refuse collection route worksheet. The first step is the preparation of the map. Using the data on the collection stop data sheet and summary, identify the dwelling units where collections are made on the map, and for each block show the number of pickup points, the containers and the average weight per container. These data are shown for each alley area within a block; for a street length between two connecting streets; or for any other convenient breakdown of street or alley.

Next, develop the combined collection workload for the first day's collection on which the routes will be based. This workload is developed using 70 percent of the containers and 60 percent of the weight. Show the location of pedestrian paper boxes that will be emptied by the collection crew and the frequency of the collection that will be required from the boxes. Show D. C. buildings and the number of cans and the frequency of collection that will be required from these buildings.

The refuse collection route worksheet is used to tabulate the crew time and the weight for each load of refuse collected for the revised routes. The weights should be a maximum of 9,000 pounds per load and the total crew time should not exceed 1920 minutes.

The time values are applied as shown on the worksheet. The time value for that work associated with the handling of containers is constant at .44 minutes per container. The time value for that work associated with the pickup points is selected from one of five values. These values are based primarily on the distance between pickup points caused by the dispersion of houses within the area. The average, or what could be considered a normal situation, is a mixture of single, detached dwellings and duplexes and should use the time of .99 minutes per pickup point. Separated single unit dwellings should require 1.24 minutes per pickup point and the higher concentrations of row houses mixed with multi-family dwellings would require .74 minutes per pickup point. The extreme situations of isolated single dwelling units should use the time of 1.49 per pickup point while two sided alley collection from multi-family units would use .49 per pickup point.

The time for laborers to travel to and from the area is taken from the travel map of the city. The time allowed from the dispatch point to the route area plus the time from the route area to the dispatch point is multiplied by 4 for the three laborers and the driver to make one round trip.

The driver travel time is calculated by multiplying the number of trips to the disposal site times the travel time plus the time required to dump the load.

The personal, wait and contingent allowance is calculated next. The morning and evening delays are applied to the first and last loads of the day. This is a total of four times 12 or 48 minutes which can be entered in the total column. The rest breaks are considered to be ten minutes for each person in the morning and ten minutes for each person in the afternoon, exclusive of the driver. This amounts to a total of 60 minutes. These rest breaks for the laborers should be taken during the time the packer is making the trip to the disposal site. The "wait for packer" time is calculated by multiplying the time required for the trip to and from the disposal site times three, and subtracting the sixty minute break time. In addition, another thirty minutes is allowed for each of the four crew members at the end of the day to compensate for the incentive pace and for heavy days following holidays and rain storms. The total personal, wait and contingent time should be a minimum of 320 minutes.

The refuse collection route worksheet is prepared by entering time and weight calculated for each load. The number of pickup points for each load is listed under the units column and multiplied by the unit factor giving the time for each category of pickup point. The number of

REFUSE COLLECTION ROUTE WORK SHEET

ACTIVITY	UNIT FACTOR	LOAD 1		LOAD 2		LOAD 3		LOAD 4		
		U	T	U	T	U	T	U	T	Total
	.49									
	.74									
Pickup Points	.99									
	1.24									
	1.49									
Containers	.44									
Labor Travel to and From Route, 2 (T x 4)=										
Driver Travel to Disp., (T_2 + Td) N =										
Personal, Wait and Incentive Allowance										
Morning & Evening, 4 x 12	48									
Rest Breaks 2x (3x10) = 60	60									
Wait for Packer 3 ( ) - 60										
Incentive (Balance)	120									
Total	320 min.									
Total Day										
Weight										1920

SE-649T
(2/70)

containers is entered in the units column and multiplied by .44 giving the time for container handling. The point at which to go from load 1 to load 2 and to load 3 must be made considering the three following points: first, it should be about 1/3 of the productive time for the work day, or second, when the weight of the load approaches 9,000 pounds and third, at a convenient breakpoint within the route area. The travel time to and from the route is entered in the unit factor column and four times this factor is entered under load 1 and four times the factor from the route is entered under the last load column. The morning and evening allowances are four times six or 24 entered in the load 1 column and the last load column. The rest breaks are entered in the first and last load columns. These are three times ten or thirty minutes for each break. The wait for packer is three times the driver travel time to and from the disposal site minus the 60 minutes break and is entered under the second load. The contigent allowance is four times thirty minutes or the time necessary to add the total up to a 1920 minute workday. This figure is entered in the total column. The calculated weight is shown at the bottom of the page. The average weights for loads or portions of loads and the number of containers are multiplied to get a weight for each load and a total weight for the day.

A route map will then be prepared for use by the drivers and others concerned on a scale of 1 to 400. This map will provide a directional line showing the driver the route to take during pickup of the refuse in the prescribed route. Residences, public buildings, pole boxes, and any other pickup points or special indications will be marked on the map.

A travel time map of the city should be prepared and maintained. This map will show the travel time required from all pertinent points, such as garages, incinerators, area branch offices, to all areas that are expected to be serviced from these points. This map should be developed by driving the various routes from the points of origin and marking off the map at 1/10 of an hour or six minute intervals along the way. A look at the map can then easily define distances to and from the origin points to the nearest six minutes or average to the nearest three minutes.

Normal route collections are to be made on Monday and Thursday, or Tuesday and Friday, leaving the workload for Wednesday to be developed. Wednesday's work will consist of the collection of bulky objects, special requests, and alley and street cleaning by the truck crew method. The amount of work to be accomplished on Wednesday by the refuse collection crew will be laid out on a daily assignment sheet by the foreman in conjunction with the dispatcher. The personal, wait and contingent allowance and travel to and from the route will be calculated first, leaving the remainder of the time of the work day for the performance of productive collection work. The time for each task will be calculated using a task benchmark book to be developed.

Preceding page blank

Routes for the collection of school refuse and large metal objects will be developed. These will be collected by a special packer and crew which will also be on standby for emergencies or other contingencies. This crew will work on an eight hour day beginning at 8 or 9 A. M.. A daily assignment sheet will be prepared for this crew in the same manner as that for the Wednesday work of the regular collection crews.

The street cleaning route development workload will consist of three types of work. These are the white wing cart routes, mechanical sweepers with mechanical sweeper assistant and finally the crew which picks up the refuse that is collected and dumped by the mechanical sweeper at convenient collection points.

The white wing cart routes are developed for those area as noted on a street cleaning inventory map. The white wing cart routes are calculated at 2,577 minutes per 100 curb feet or 3.1 curb miles per work day for light commercial. Allowances are given white wing cart routes for travel time to and from the route and two ten minute breaks.

The mechanical sweeper routes are developed corresponding to that marked on the street cleaning inventory map. The length of each street is measured and entered on the map. These are then totaled, multiplied by the rate that mechanical sweeper can move and the route plotted. Each sweeper route is calculated using the time values as shown.

Mechanical sweeper assistants are provided in those areas where assistance is required to sweep refuse into the streets from sidewalks, between parked cars, and other areas where mechanical sweepers cannot reach.

The time required for mechanical sweeper pickup crews is developed by allowing the travel time from the travel map plus a constant per pickup point. The mechanical sweeper pickup route is prepared daily by the foreman on the work assignment sheet.

Mechanical Sweeper Speeds -

To and From Route	6.62 mph (traffic) 10.00 mph max. (freeway)
To and From Dump	7.40 mph
MPH Sweep	
Alleys - 3.74	
Streets - 4.46	
Miles/day no-sweep	5% of miles swept
MPH no-sweep	7.4